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THE GOVERNANCE OF STRATEGIC IT INITIATIVES FOR INNOVATION

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Cette thèse intitulée :

THE GOVERNANCE OF STRATEGIC IT INITIATIVES FOR INNOVATION

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DEDICATION

I would like to dedicate this thesis to my lovely wife Sherine who supported my research work from the start and to my adorable newborn son Karl who brought an enormous amount of joy into our lives.

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RÉSUMÉ

La présente recherche explore les différents systèmes de gouvernance utilisés par les dirigeants des TI (ou directeurs des systèmes d'information) dans leur gestion des initiatives stratégiques TI visant la transformation de l'entreprise, l'innovation et la création de valeur. Cette recherche propose un modèle systémique composé de trois axes et deux modes de gouvernance mettant en opposition les initiatives TI visant l'exploitation et l'efficience et celles visant l'exploration et la croissance par l'innovation.

Il y a une décennie, les TI étaient associés à l'automatisation, aux économies d'échelles et à l'efficience, alors qu'aujourd'hui nos résultats de recherche montrent que les TI peuvent aussi aider l'entreprise à innover, à croître et à créer de nouveaux marchés. Les approches existantes de gestion et de gouvernance des TI mettent principalement l'emphase sur l'exploitation et la création de valeur par l'efficience mais ne fournissent pas les perspectives multidimensionnelles requises pour répondre aux enjeux de la stratégie TI exploratoire où des systèmes innovateurs TI sont co-créés dans des contextes de projets caractérisés par de hauts niveaux d'incertitude et de changement. Pour gérer de telles initiatives stratégiques, les dirigeants ont besoin d'adopter des approches alternatives aux techniques existantes de planification stratégique et de gestion de projet.

Trois approches de gouvernance observées dans la littérature ont inspiré la recherche et aidé à élaborer le modèle de recherche final : (1) la gouvernance TI, (2) la gouvernance de projet, et (3) la gouvernance relationnelle. Aucune de ces approches ne fournit la perspective systémique requise dans les initiatives stratégiques TI permettant de gérer à la fois les relations de projet, les relations intra-organisationnelles et les relations inter-organisationnelles.

La question de recherche qui a émergé des observations initiales faites sur le terrain ainsi que de la revue de littérature est la suivante : quels mécanismes et systèmes de gouvernance les dirigeants des TI utilisent-ils pour gérer leurs initiatives stratégiques et innovatrices TI?

Pour répondre à cette vaste question et pour étudier la nature hautement dynamique des initiatives stratégiques TI, une approche de recherche qualitative de développement théorique a été adoptée. Un modèle de recherche s'est progressivement développé et stabilisé à travers un processus de saturation conceptuelle. Une étape exploratoire d'entretiens et de voyages a été suivie d'une étape d'analyse et l'approche de théorisation ancrée a été choisie comme cadre sous-jacent avec deux techniques d'analyse qualitative : l'analyse typologique et l'analyse de contenu.

Les résultats de la recherche suggèrent des implications théoriques et managériales importantes. Premièrement, les résultats démontrent que la gouvernance des initiatives TI stratégiques est systémique. C'est à dire qu'au lieu d'une approche unidimensionnelle centrée soit sur les relations courantes intra-organisationnelles ou sur les relations inter-organisationnelles, les initiatives stratégiques TI requièrent une approche tridimensionnelle. Le modèle final propose des mécanismes qui permettent de connecter les activités (et relations) de projet temporaires et détachées aux activités (et relations) intra-organisationnelles et inter-organisationnelles qui sont plus durables et stables.

Deuxièmement, les résultats démontrent que deux architectures (systèmes) de gouvernance très distincts sont utilisés pour gérer deux très différents types d'initiatives TI stratégiques et innovatrices : (1) les initiatives visant l'efficience, et (2) les initiatives visant la croissance. Cette distinction significative représente la découverte centrale de la présente thèse.

Finalement, la gouvernance est plus variée, plus intense et plus ouverte lorsque l'initiative TI vise l'innovation exploratoire et la croissance. Le niveau d'incertitude est plus élevé au sein des initiatives qui visent la croissance et des relations plus complexes nécessitent une coordination

plus élaborée. Par ailleurs, l'innovation qui résulte des initiatives visant la croissance est ouverte et collaborative pour les raisons suivantes : (1) la gouvernance inter-organisationnelle est plus critique que la gouvernance intra-organisationnelle au sein des initiatives visant la croissance, et (2) les entreprises utilisent des approches collaboratives plutôt que compétitives. Les résultats montrent que les dirigeants des TI au sein des initiatives visant la croissance utilisent des stratégies hautement collaboratives qui s'appuient sur les principes de l'innovation ouverte et mettent plus d'emphase sur des mécanismes clés inter-organisationnels pour mieux gérer leurs initiatives TI.

ABSTRACT

The present research explores the different governance systems used by senior IT managers to manage their strategic IT initiatives for business transformation, innovation and value creation. The research proposes a systemic model composed of three governance axes and two governance modes where exploitative efficiency-oriented IT initiatives are opposed to exploratory innovation-oriented initiatives.

While a decade ago IT was seen as a tool for automation, economies of scale and efficiency, today our research findings show that IT can also be used for innovation, growth and market creation. Existing IT management and governance approaches largely focus on exploitation and value creation through efficiency and do not provide the multi-dimensional perspectives needed to address the front-end of IT strategy where new systems are co-created in project contexts characterized by high levels of uncertainty and change. To manage such strategic IT initiatives managers need alternatives to the rational planning and forecasting techniques.

Three governance approaches observed in the literature were leveraged to build the final research model: (1) IT governance, (2) project governance, and (3) relational governance. None of these approaches provides the systemic perspective needed in strategic IT initiatives where project, intra-organizational and inter-organizational decision-making relationships are addressed simultaneously.

The following question that emerged from both initial field observations and the literature review guided the research: What governance mechanisms and systems senior IT managers use to manage their strategic and innovative IT initiatives?

To answer this broad question and to study the highly dynamic nature of strategic IT initiatives, a theory-developing qualitative approach was adopted. A research model was developed and stabilized through a process of conceptual saturation. An exploratory stage of interviews and

travels was followed by a stage of analysis and the Grounded Theory (GT) methodology was chosen as an underlying approach along with two qualitative analysis techniques, typological analysis and qualitative content analysis.

The results and key findings suggest important theoretical and managerial implications. First, the findings indicate that governance in strategic IT initiatives is systemic. Instead of a one-dimensional view that either focuses on ongoing intra-organizational or inter-organizational relationships (in the literature), strategic IT initiatives require a three-dimensional view. The final model suggests mechanisms to connect the temporary one-off project relationships and activities to the more stable and long-term intra-organizational and inter-organizational relationships.

Second, the results show that two very distinct governance architectures (sets of governance mechanisms) are used to manage two different types of strategic and innovative IT initiatives: (1) efficiency-oriented initiatives, and (2) growth-oriented initiatives. This distinction is significant and provides the central finding of this thesis.

Lastly, governance was found to be more diverse, intense and open when the IT initiative is oriented toward exploratory innovation and growth. Uncertainty is higher in growth-oriented initiatives and more complex relationships need to be coordinated. In other words, the results suggest that higher levels of uncertainty and complexity in interactions require higher levels of governance. Moreover, IT-enabled innovation in growth-oriented initiatives is open and collaborative in two different ways: (1) inter-organizational governance is more critical than intra-organizational governance in growth-oriented IT initiatives, and (2) firms use collaborative strategies as opposed to competitive strategies, and. The results show that in growth-oriented initiatives senior IT managers use highly collaborative strategies that draw upon the principles of open innovation and focus more on key inter-organizational governance mechanisms to manage their IT initiatives effectively.

CONDENSÉ EN FRANÇAIS

Introduction

Il y a une décennie, la révolution de l'information était associée à l'automatisation des processus d'affaires et des routines de travail (Drucker, 2002). Aujourd'hui les TI (technologies de l'information) ont une place de plus en plus importante au sein des initiatives stratégiques des entreprises cherchant à innover, à croître et à créer de nouveaux marchés.

La présente recherche a été déclenchée par des observations faites lors d'études réalisées pour le projet de recherche international basé à l'École Polytechnique de Montréal appelé MINE (Managing Innovation in the New Economy). Ces études portaient principalement sur le processus d'innovation des entreprises développant des outils TI de R-D et d'ingénierie comme Dassault Systèmes et Autodesk. Ces entreprises dépendaient de plus en plus de leurs clients pour développer de nouveaux produits et une grande partie de l'innovation se réalisait à travers des initiatives stratégiques ouvertes et collaboratives dirigées par ces clients. En conséquence, l'étude des initiatives stratégiques TI lancées par les grands sponsors de systèmes TI innovateurs apparaissait comme une évolution naturelle des études réalisées au sein du projet MINE.

L'objectif initial de la recherche était de comprendre comment les entreprises gèrent leurs initiatives TI stratégiques pour l'innovation. Le concept de gouvernance a été introduit rapidement pour tenir compte des processus d'alignement et de coordination et des mécanismes relationnels importants observés et qui dominaient la dynamique de gestion stratégique de ces initiatives. Les mécanismes relationnels relevant des principes de gouvernance étaient principalement reliés au nombre important d'intervenants internes et externes collaborant pour le co-développement et l'implantation de nouveaux systèmes.

Revue de littérature et méthodologie

Cette première partie de la thèse présente en premier lieu la revue de littérature effectuée et en deuxième lieu la question de recherche et la méthodologie utilisée.

La littérature examinée introduit des concepts importants qui ont grandement influencé la présente recherche mais les perspectives théoriques ne permettent pas de répondre à la question de recherche mettant en relation la gouvernance des initiatives TI et l'innovation qui en découle. Aucun modèle théorique n'aborde l'approche systémique observée au sein des initiatives TI stratégiques ou fait la distinction entre les initiatives reliées à l'exploitation et l'efficience et celles reliées à l'exploration et la croissance. La revue de littérature a permis d'accomplir les deux tâches suivantes :

1. Explorer la relation conceptuelle dans la littérature entre la gouvernance et l'innovation du point de vue des TI.
2. Comprendre jusqu'à quel point chaque champ théorique permet de répondre à la présente question de recherche.

Le lien conceptuel entre la gouvernance et l'innovation

Dans la littérature le concept de gouvernance est utilisé pour relier et aligner la stratégie à (1) la gestion des TI et (2) la gestion de projet. En conséquence, le concept apparaît très approprié pour l'étude des initiatives stratégiques TI et leur impact sur l'innovation. Alors que certains auteurs commencent à s'intéresser au lien entre la gouvernance et l'innovation dans le domaine des TI (Gordon and Tarafdar, 2010; Weeks and Feeny, 2008), le concept de gouvernance est surtout utilisé pour aligner les IT à la gouvernance corporative (Henderson and Venkatraman, 1999; Weill and Ross, 2004; De Haes and Van Grembergen, 2004), et pour créer un avantage concurrentiel par les relations inter-organisationnelles au niveau des processus d'outsourcing et des chaînes d'approvisionnement (Dyer and Singh, 1998; Goo et al., 2009). Le concept est utilisé aussi pour connecter la gestion de projet à la gouvernance corporative (Turner, 2006) et pour gérer des grands projets de systèmes complexes impliquant un grand nombre d'intervenants stratégiques (Miller and Lessard, 2001). En général, la littérature associe la gouvernance à la

création de valeur par l'exploitation, la réduction de coûts et l'efficience plutôt que par l'exploration, l'innovation et la croissance. Par contre, l'intérêt porté récemment par quelques auteurs à l'approche de gouvernance pour mieux comprendre la gestion stratégique dans des contextes plus innovateurs, plus exploratoires et dont le niveau d'incertitude est plus élevé justifie la présente recherche.

La pertinence et les limites des champs théoriques

Trois principaux champs théoriques ont fait l'objet de la revue de littérature : (1) les typologies d'innovation et l'innovation par les TI, (2) la gestion et la gouvernance des TI, et (3) la gestion et la gouvernance de projets.

Premièrement, une revue des typologies principales d'innovation et des définitions pertinentes de l'innovation a été réalisée. Plutôt que de suivre la typologie la plus reconnue introduite par Schumpeter (1934) et reprise par l'OCDE (2005a) proposant quatre types d'innovation (produit, processus, marché et organisation), la typologie mettant en opposition l'innovation d'exploitation plus incrémentale (visant l'efficience) avec l'innovation d'exploration plus radicale (visant surtout la croissance) a été adoptée dans cette recherche (Jansen et al., 2006; Miller and Olleros, 2007; Abecassis-Moedas and Benghozi, 2012). Cette typologie est inspirée par la typologie introduite par les auteurs de gestion stratégique mettant en opposition l'exploitation et l'exploration (March, 1997; Shapira, 1997; Saloner et al., 2001).

La littérature sur l'innovation par les TI est relativement récente et les TI ont été traditionnellement reliées à la création de valeur par la réduction des coûts et l'efficience plutôt que par l'innovation et la croissance. Un grand nombre de dirigeants et de gestionnaires pensent toujours que les TI créent des barrières à la créativité et l'innovation par ce que les systèmes TI sont traditionnellement conçus pour imposer une structure sur les processus de l'entreprise (Gordon and Tarafdar, 2010). Trois principales limites ont été observées dans la littérature sur l'innovation par les TI :

1. La relation entre les TI et l'innovation n'est pas étudiée selon la perspective du projet où l'incertitude est plus élevée, les changements sont plus fréquents et des mécanismes critiques de projet doivent être pris en compte.
2. Les relations inter-organisationnelles sont presque inexistantes. Les auteurs qui explorent les liens entre les TI et l'innovation se limitent surtout aux activités internes de l'entreprise et sous-estiment l'importance des relations et activités externes.
3. Le concept de gouvernance a été introduit par quelques auteurs mais celui-ci n'a pas été développé pour expliquer la relation entre les TI et l'innovation.

Le deuxième champ théorique examiné est celui de la gestion et de la gouvernance des TI. Celui-ci a été divisé en deux groupes d'études : (1) celles qui portent sur l'alignement stratégique des TI et de la gouvernance des TI à l'intérieur de l'organisation, et (2) celles qui touchent à l'outsourcing et aux relations TI inter-organisationelles. Alors que cette littérature démontre un intérêt croissant quant à la compréhension de la relation qui existe entre les TI, la stratégie et l'avantage concurrentiel, elle présente quand même les cinq limites suivantes pour la présente recherche :

1. Les études mettent l'emphase sur la composante d'efficience et d'exploitation de la stratégie plutôt que sur sa composante d'innovation et d'exploration.
2. La gouvernance TI focalise sur les relations intra-organisationnelles et les modèles existants ignorent en général les liens entre les initiatives TI et l'innovation.
3. Les auteurs qui étudient les relations inter-organisationnelles et la gouvernance relationnelle se limitent aux relations courantes et stables entre clients et fournisseurs (au niveau de l'outsourcing ou des chaînes d'approvisionnement).
4. Il y a une division (segmentation) importante entre (1) la littérature qui porte sur l'alignement stratégique et la gouvernance des TI à l'intérieur de l'organisation, et (2) celle qui touche à l'outsourcing et aux relations TI inter-organisationelles.
5. La gouvernance relationnelle inter-organisationnelle n'a pas été étudiée dans le contexte des initiatives stratégiques TI visant à stimuler l'innovation et la croissance de l'entreprise et à explorer de nouveaux marchés du point de vue de l'acheteur.

Le troisième champ de littérature, celui de la gestion et de la gouvernance de projets, est représenté premièrement par les auteurs cherchant des approches alternatives aux techniques normatives de gestion de projet, et deuxièmement par les auteurs ayant développé l'approche de gouvernance de projet pour adapter la gestion de projet à la stratégie corporative ainsi qu'aux situations complexes dont le degré d'incertitude et d'innovation est plus élevé. Les principales limites de ce champ de littérature sont les suivantes :

1. En général, le besoin est ressenti pour des approches alternatives aux techniques normatives de gestion de projet permettant de gérer des situations plus complexes et caractérisées par un plus haut niveau d'innovation et d'incertitude.
2. Le concept de gouvernance de projet n'est pas encore bien défini dans la littérature et celui-ci n'a pas encore été appliqué dans le contexte des initiatives TI stratégiques.
3. Il y a une segmentation dans la gouvernance de projet et deux écoles de pensées émergent : (1) une école de pensée qui est centrée sur le gouvernance intra-organisationnelle et les liens entre la gestion de projet et la gouvernance corporative (Turner, 2006; Weaver, 2007; Müller, 2009), et (2) une autre école de pensée qui met l'emphase sur les structures des grands projets d'ingénierie et publics et qui ignore les relations et processus intra-organisationnels (Miller and Lessard; 2001; Flyvbjerg, 2003).

Le tableau suivant présente un sommaire de la pertinence de chaque champ théorique étudié et du degré de manifestation de chaque concept clé de l'étude dans la littérature.

Champs théoriques	**Gouvernance**			**Innovation**	
	Projet	Intra-org.	Inter-org.	Exploration (croissance)	Exploitation (efficience)
L'innovation par les TI	Faible	Forte	Moyenne	Moyenne	Forte
L'alignement et la gouvernance des TI	Faible	Forte	Faible	Faible	Forte
L'outsourcing des TI et les relations externes	Faible	Faible	Forte	Faible	Forte
La gouvernance et la gestion de projets	Forte	Moyenne	Moyenne	Moyenne	Forte

La question de recherche

Cette recherche découle d'une série d'observations préliminaires faites au sein du projet MINE lors de l'étude de l'innovation des développeurs de systèmes TI, de R-D et d'ingénierie. Ces observations ont amené à la question de recherche suivante :

- Quels mécanismes et systèmes de gouvernance sont créés et utilisés par les dirigeants des TI pour gérer les initiatives TI stratégiques selon le type d'innovation que ces initiatives créent?

L'approche qualitative de développement théorique

Pour répondre à la vaste question de recherché ci-dessus et pour étudier l'événement émergent, complexe et dynamique des initiatives TI stratégiques en utilisant les concepts théoriques émergents de l'innovation par les TI et la gouvernance, l'approche exploratoire de théorisation ancrée (Grounded Theory) a été adoptée (Corbin and Strauss, 1990; Paillé, 1994; Laperrière, 1997 ; Colquitt and Zapata-Phelan, 2007). Deux techniques d'analyse compatibles ont contribué au processus de théorisation de cette recherche: (1) l'analyse typologique (Desgagné, 2005), et (2) l'analyse de contenu qualitatif (Corbin and Strauss, 1990; Hsieh and Shannon, 2005; Suddaby, 2006).

Survol des cinq phases de la recherche

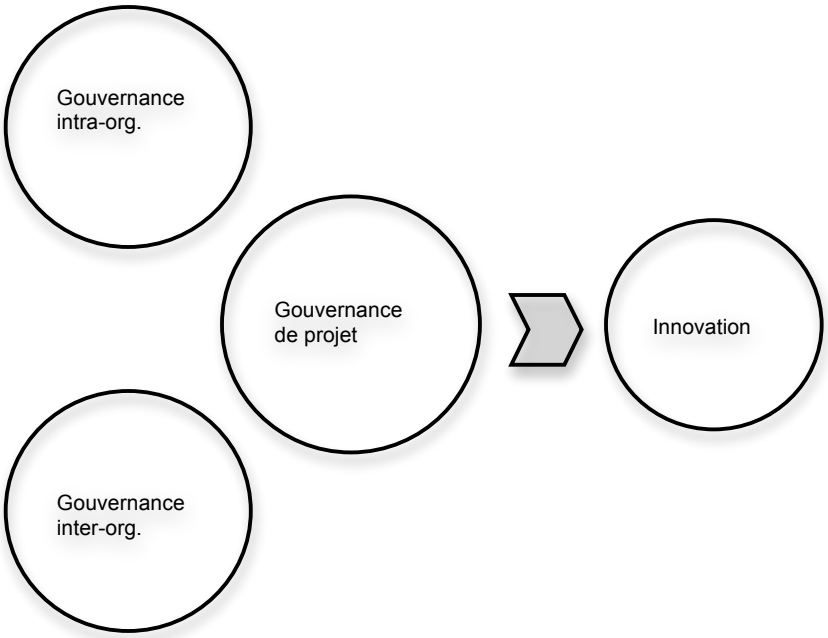
En s'appuyant sur les processus et phases de recherche utilisés par des auteurs ayant appliqué l'approche de théorisation ancrée (Paillé, 1994; Laperrière, 1997 ; Desgagné, 2005), la présente recherche peut être organisée en cinq phases générales. Il faut toutefois noter que même si les phases sont présentées de manière séquentielle, la recherche s'est déroulée de manière très itérative et les phases se sont souvent chevauchées.

Le tableau ci-dessous présente les cinq phases principales de la recherche :

Phase	Activités clés	Résultat
1. Première phase exploratoire : premières itérations de collecte de données et premier modèle intermédiaire.	- Entretiens avec dirigeants TI au Canada et en Inde. - Analyse préliminaire de données à travers plusieurs itérations (Nvivo). - Revue de littérature en parallèle.	- 46 dirigeants interviewés et 13 cas d'initiatives TI stratégiques couverts. - Observation de tendances TI et de nouvelles logiques d'innovation. - Trois champs de littérature explorés. - **Premier modèle intermédiaire** où 3 dimensions de gouvernance sont introduites : (1) projet, (2) intra-org, et (3) inter-org.
2. Deuxième phase exploratoire : dernière itération d'échantillonnage et saturation conceptuelle.	- Entretiens avec dirigeants TI en France (CIGREF) - Revue de littérature en parallèle.	- 6 nouveaux répondants interviewés et 5 nouveaux cas ajoutés à l'échantillon. - Échantillonnage théorique complété avec 18 cas d'initiatives TI stratégiques. - Grilles de codage tentatives (Nvivo)
3. Première phase d'analyse : l'analyse qualitative complète des 18 cas	- Codage (ouvert et axial) des entrevues à travers 7 itérations jusqu'à saturation conceptuelle en utilisant le logiciel Nvivo. - Extraction des thèmes secondaires du modèle.	- 18 cas analysés et utilisés pour raffiner le modèle de recherche. - **Deuxième modèle intermédiaire.** - Revue de littérature plus ciblée.
4. Deuxième phase d'analyse : la typologie et les prototypes	- L'analyse typologique et la création de familles d'initiatives TI visant l'innovation. - La sélection de prototypes.	- Échantillon de 18 cas divisé en 3 familles en utilisant une typologie d'innovation. - 3 prototypes par famille d'initiatives TI.
5. Troisième phase d'analyse : liens entre la gouvernance et l'innovation et analyse de contenu	- Analyse de contenu qualitatif pour raffiner les résultats. - L'analyse comparative et l'exploration des liens entre la gouvernance et les types d'innovation.	- Les résultats de l'analyse organisés en 3 parties (les 3 axes de gouvernance). - **Le modèle de recherche final.** - Les implications théoriques clarifiées.

La première phase exploratoire est la phase la plus itérative et la plus longue dans laquelle des entrevues ont été réalisées avec 45 répondants au Canada et en Inde. C'est à travers cette phase que les catégories principales du modèle de recherche ont été identifiées et que le premier modèle intermédiaire a émergé. C'est à la fin de cette phase que la gouvernance des initiatives TI stratégiques a été divisée en trois axes : (1) projet, (2) intra-organisationnel, et (3) inter-organisationnel. Cette phase se caractérise par plusieurs itérations d'entrevues, d'analyse de

données et de revues de littérature réalisées en parallèle. Voici une illustration du premier modèle intermédiaire :



La deuxième phase exploratoire représente la dernière itération d'échantillonnage théorique dans laquelle les dernières entrevues ont été réalisées. Les entrevues réalisées dans cette phase ont eu lieu en France grâce à un travail collaboratif avec le CIGREF (Club Informatique des Grande Entreprises Françaises). Le travail de collecte de données a été plus ciblé dans cette phase et cinq des six entrevues réalisées avec des dirigeants TI français ont été retenues dans l'échantillon.

Analyses et résultats

Les trois phases d'analyse qui suivent les deux phases exploratoires représentent aussi les résultats de la recherche. Ces trois phases sont présentées en trois chapitres distincts et constituent la deuxième partie de la thèse.

Première analyse : le codage et la catégorisation de l'échantillon de 18 cas

Cette première phase d'analyse consiste d'abord à reprendre les 18 cas sélectionnés et à coder leur contenu à l'aide du logiciel Nvivo. Ce travail d'analyse a permis de raffiner la grille de

codage et de stabiliser les catégories du modèle. Après sept itérations de codage dans Nvivo, la saturation conceptuelle a été atteinte et 29 thèmes (mécanismes) de gouvernance ont émergé dans le modèle de recherche. Une nouvelle version du modèle de recherche est obtenue à la fin de cette phase : le deuxième modèle intermédiaire. Le tableau ci-dessous présente les 29 thèmes de gouvernance qui ont émergé :

Gouvernance de projet	**Gouvernance intra-org.**	**Gouvernance inter-org.**
1. Roadmapping 2. Modularity 3. Performance Criteria 4. Strategic Planning Sessions 5. Committees 6. Governance Rules & System 7. Project Reviews 8. Funding Process 9. PMO Role & Nature 10. Security & IP 11. Trust & Transparency	1. Change Management 2. Internal Demand 3. Internal Business Support & Roles 4. IT Roles & Competences 5. New Capabilities & Learning 6. Business-Technology Partnerships 7. Internal Team Selection Process 8. Shared IT Support	1. Partner Selection Process 2. Partner Active Role 3. Outsourcing / Externalization 4. Partnerships 5. Contract Management 6. Adopting Applications 7. Influencing Vendor Roadmaps 8. Social & Personal Contacts 9. Regulations 10. External R&D Role

Une des opérations les plus importantes de la septième itération de cette première phase d'analyse est l'extraction des thèmes secondaires du modèle de recherche. Les thèmes (mécanismes) principaux dans le tableau précédent excluent les thèmes secondaires.

Deuxième analyse : les familles et prototypes d'initiatives TI innovatrices

Cette deuxième phase d'analyse consiste à diviser les cas (les initiatives TI stratégiques) en familles selon le type d'innovation qui découle de ces initiatives. Les questions reliées à l'innovation ont été posées dans les entrevues ce qui a permis de comparer les initiatives en terme de leur effet sur l'innovation. Les deux types d'innovation servant à comparer les initiatives à ce niveau mettent en opposition (1) l'innovation d'exploitation qui touche aux processus d'affaires de l'entreprise et qui amène à l'efficience, et (2) l'innovation exploratoire qui touche aux produits de l'entreprise et qui amène à la croissance et la création de marché. Cette typologie a été grandement inspirée par les typologies existantes dans la littérature d'innovation et de stratégie.

Les scores obtenus pour les deux types d'innovation ont permis de diviser l'échantillon en trois familles d'initiatives : (1) une famille visant des hauts niveaux d'efficience, (2) une famille mixte visant des niveaux moyens d'efficience et de croissance, et (3) une famille visant des hauts niveaux de croissance. Pour raffiner et simplifier la recherche et pour faciliter la compréhension des résultats, trois prototypes d'initiatives TI ont été sélectionnés dans chacune des familles. Ces prototypes sont les cas les plus complets, les plus riches et les plus représentatifs. Le tableau suivant présente les neuf prototypes sélectionnés à la fin de cette deuxième phase d'analyse :

FAMILLE 1	**FAMILLE 2**	**FAMILLE 3**
1. CRM - ENERGY	1. BASE II - BANK	1. DDS-THEME PARK
2. CRM - RESORTS	2. ECM - DEFENSE	2. MC-OPTIC
3. ERP - FOOD	3. PLM AEROSPACE1	3. PLM-ENERGY

Les cas de la famille 1 (visant l'efficience) sont des projets de systèmes CRM et ERP de grande taille (moyenne proche de 300$ million) touchant à des domaines stables de l'entreprise et amenant à des niveaux importants de transformation, de centralisation et d'innovation au niveau des processus d'affaires de l'entreprise. Les cas de la famille 2 (mixtes) sont des initiatives de taille moyenne (moyenne proche de 60$ million) combinant des systèmes standards avec des systèmes plus innovateurs. Les cas de la famille 3 (visant la croissance) sont des initiatives de systèmes innovateurs de plus petites tailles (moyenne proche de 25$ million) et touchant à des domaines émergents et dynamique de l'entreprise et surtout qui contribuent à son avantage concurrentiel dans son industrie.

Troisième analyse : les liens entre la gouvernance et les différents types d'innovation

Cette phase consiste à explorer les différences qui existent entre les trois familles d'initiatives (créées dans la phase précédente) au niveau des mécanismes et des systèmes de gouvernance créés et utilisés par les dirigeants TI. En d'autres termes, le travail d'analyse ici vise à comprendre les distinctions et les nuances qui existent au sein de chaque catégorie et sous-catégorie de gouvernance selon le type d'innovation (ou selon le type de famille d'initiatives TI). Les analyses et les comparaisons effectuées dans cette phase tiennent compte à la fois de

données quantitatives (les fréquences d'occurrences des thèmes) et de données qualitatives mettant l'emphase sur les nuances et les distinctions qualitatives.

Chaque axe de gouvernance (projet, intra-organisationnel et inter-organisationnel) a fait l'objet d'analyses approfondies soutenues par des extraits d'entrevues pour chacun des cas prototypes. La présentation de cette phase est longue à cause de l'importance portée à la description des nuances pour chacun des thèmes de gouvernance. La description des nuances et l'explication soutenue par des exemples sont recommandées en recherche qualitative.

Discussion et conclusions

Cette partie finale de la thèse présente les résultats principaux de l'étude, les implications théoriques, méthodologiques et managériales ainsi que ses limites et les suggestions pour des études futures.

Résultats principaux de l'étude

Les résultats principaux de l'étude peuvent être séparés en deux grandes lignes :

1. Les caractéristiques communes et systémiques des familles d'initiatives TI combinat simultanément trois dimensions de gouvernance : (1) projet, (2) intra, et (3) inter.
2. Les caractéristiques distinctives des systèmes de gouvernance des deux familles se faisant opposition : (1) celle visant l'efficience, et (2) celle visant la croissance.

Ces grandes lignes sont illustrées dans le modèle final de la recherche.

Premièrement, les résultats montrent que les dirigeants TI créent et utilisent simultanément des mécanismes de gouvernance de projet leur permettant de gérer l'aspect dynamique, temporaire et déstabilisant des initiatives, et des mécanismes de gouvernance intra- et inter-organisationnels leur permettant de gérer les relations internes et externes plus stables avec tous les détenteurs

d'enjeux. Cet aspect systémique de la gouvernance existe au sein de toutes les initiatives étudiées et représente une caractéristique commune à toutes les initiatives TI stratégiques et innovatrices. Selon les scores d'occurrence des thèmes de gouvernance, les résultats montrent que 38% des occurrences sont de type projet, 37% sont de type inter-organisationnel et 25% sont de type intra-organisationnel.

Deuxièmement, les résultats montrent que les systèmes de gouvernance créés et utilisés dans les deux familles d'initiatives TI se faisant opposition, celle visant l'efficience et celle visant la croissance, sont très différents. Les différences et distinctions analysées sont à la fois quantitatives (les occurrences reflétant l'importance d'un mécanisme et son intensité) et qualitatives (nuances et types de sous-thèmes). Les scores d'occurrence montrent que 80% (23 sur 29) des mécanismes de gouvernance sont plus importants et plus intenses dans les initiatives visant la croissance et l'exploration et seulement 20% (6 sur 29) mécanismes sont plus importants dans les initiatives visant l'efficience. Alors que ces variations quantitatives sont importantes, les caractéristiques qualitatives des deux pôles (visant l'efficience et visant la croissance) présentent des distinctions encore plus intéressantes et significatives. Il est important de noter que la famille mixte d'initiatives TI a été retirée du modèle final par ce que les résultats ne montrent pas de variations significatives (quantitatives et qualitatives) entre cette famille et les deux autres familles. Les résultats obtenus au sein des initiatives de cette famille mixte sont moins consistants et nécessiteraient des études plus approfondies.

Alors que des distinctions importantes existent entre les deux types d'initiatives TI (visant l'efficience et visant la croissance) au niveau des trois dimensions de gouvernance, les distinctions les plus importantes se retrouvent au niveau de la gouvernance inter-organisationnel. Alors que 76% des mécanismes inter-organisationnels sont apparus dans toutes les initiatives visant la croissance, seulement 48% des mécanismes inter-organisationnels sont apparus dans ces initiatives. Aussi, à l'exception d'un seul mécanisme, tous les mécanismes inter-organisationnels ont montré de plus importants scores dans les initiatives visant la croissance. En général, les résultats montrent que lorsque l'initiative TI est plus exploratoire et vise la croissance et la création de marché, les dirigeants TI créent et utilisent une plus grande variété de mécanismes de

gouvernance et les utilisent plus intensément. Cela est plus évident au niveau des mécanismes inter-organisationnels à cause de l'importante collaboration qui existe entre l'équipe TI et les détenteurs d'enjeux externes lorsque l'initiative vise la croissance et la création de marché. Cette approche d'innovation ouverte requiert une gouvernance plus élaborée et complexe.

Implications théoriques

Les résultats de la recherche reliés aux caractéristiques communes systémiques des initiatives TI stratégiques présentent des implications théoriques importantes qui peuvent être résumées de la manière suivante :

1. Alors que la littérature met l'emphase sur la gouvernance TI des activités postérieures à l'implantation touchant surtout aux relations intra-organisationnelles, la présente étude a examiné les activités plus dynamiques des initiatives stratégiques TI qui précèdent l'implantation des nouveaux systèmes et qui implique un plus grand réseau de relations à la fois de type projet, intra- et inter-organisationnels.
2. La littérature actuelle d'alignement stratégique des TI et de gouvernance des TI (Henderson & Venkatraman, 1999; Feld and Stoddard, 2004; Weill & Ross, 2004; De Haes & Van Grembergen, 2004; Nolan & McFarlan, 2005; Ross et al., 2006) met l'emphase sur les relations stables intra-organisationnelles permettant de connecter la gestion des TI à la gouvernance corporative. En contraste, la présente étude a touché à l'alignement de la gestion des TI avec les intérêts des détenteurs d'enjeux internes et externes dans un contexte de projet plus dynamique et caractérisé par de plus hauts niveaux d'incertitude.
3. Alors qu'il existe dans la littérature des études pertinentes portant sur les relations TI et la gouvernance inter-organisationnelle (Dyer, 1996; Dyer & Singh, 1998; Wang & Wei, 2007; Weeks & Feeny, 2008; Goo et al., 2009; Gopal & Koka, 2012), ces études se limitent aux relations stables entre clients et fournisseurs. En comparaison, la présente étude touche aux relations inter-organisationnelles dynamiques et ouvertes dans un contexte de projet.
4. La présente étude propose une approche de gouvernance comme alternative aux techniques normatives de gestion de projet (qui domine la littérature de gestion de projets). Cette approche répond aux demandes de plusieurs auteurs recherchant des approches dans des

contextes émergents, dynamiques et innovateurs (Morris, 1997; Williams, 2005; Cicmil & Hodgson, 2006; Bresnen, 2006; Clegg et al., 2006).

5. Cette recherche contribue à la gouvernance de projet de deux façons : (1) elle ajoute une dimension inter-organisationnelle à l'approche intra-organisationnelle de la gouvernance de projet (Turner, 2006; Weaver, 2007), et (2) elle ajoute également une dimension intra-organisationnelle critique à l'approche inter-organisationnelle de la gouvernance de projet (Miller & Lessard, 2001, 2010).

Les résultats de la recherche reliés aux caractéristiques de gouvernance faisant la distinction entre les initiatives TI visant l'efficience et celles visant la croissance présentent les implications théoriques suivantes :

1. La typologie de gouvernance bidimensionnelle (mettant en opposition deux modes de gouvernance pour deux types d'innovation) n'a pas été utilisée auparavant dans le contexte des initiatives TI stratégiques visant l'innovation.
2. Dans la littérature de l'innovation par les TI (Prahalad & Krishnan, 2002; Marwaha & Willmott, 2006; Weeks and Feeny, 2008), les auteurs utilisent une typologie mettant en opposition les innovations TI opérationnelles et les innovations TI stratégiques. En contraste, la présente étude met en opposition deux types d'innovations TI stratégiques.
3. En comparaison aux deux modes de gouvernance de la présente étude, la littérature de gouvernance des TI met en opposition (1) les activités qui soutiennent la stratégie TI et qui visent à la réduction des coûts d'une part, et (2) les activités qui influencent la stratégie TI et qui créent de la valeur par l'efficience.
4. La création de la valeur dans la littérature de gouvernance des TI est associée à l'efficience alors que la présente étude montre que la création de valeur peut aussi s'associer à la croissance et la création de marché.
5. La présente étude a montré que la gouvernance inter-organisationnelle est critique dans les initiatives visant la croissance à cause des relations ouvertes et collaboratives importantes (Brandenburger & Nalebuff, 1996; Chesbrough, 2003) avec un grand nombre d'intervenants externes pour l'innovation et la création de marchés. Ces relations sont grandement ignorées dans la littérature sur l'alignement stratégique et la gouvernance des TI.

Implications méthodologiques

La majorité des études réalisées dans littérature de gestion des TI ont été réalisées sur l'exploitation des TI et sur les activités TI reliées à l'efficience en utilisant des méthodologies quantitatives de test théorique où des hypothèses sont testées par des techniques statistiques. En comparaison, la présente étude contribue au groupe émergent d'études qui cherchent à comprendre les activités les plus innovatrices et les plus dynamiques de la gestion stratégique des TI par des méthodologies qualitatives de développement théorique. Bien que la méthodologie empruntée dans la présente étude se base sur des méthodes développées par les auteurs de la théorisation ancrée et de la recherche qualitative, le processus de recherche adopté possède plusieurs particularités (dans sa structure et dans ses composantes) qui pourraient facilement être adaptées et appliquées dans des contextes similaires.

Implications managériales

Le modèle de gouvernance développé dans cette recherche est un modèle pratique permettant aux dirigeants des TI de gérer leurs initiatives TI stratégiques pour l'innovation et la création de valeur. Le modèle présente deux modes (ou deux logiques) s'appliquant à deux contextes différents d'innovation : (1) les initiatives visant l'efficience par des activités de transformation internes et d'exploitation, et (2) les initiatives visant la croissance par des activités de collaboration internes, externes et d'exploration. Cette étude fait partie des études qui contestent la vision rationaliste de la gestion stratégique et qui offrent des alternatives aux approches normatives de prédiction et de planification. L'approche de gouvernance développée et suggérée dans la présente étude offre une flexibilité permettant de gérer des activités beaucoup plus dynamiques et innovatrices.

Limites et études futures

Les limites de la présente recherche sont liées à deux facteurs principaux : (1) la nature de l'approche qualitative de développement théorique, et (2) les contraintes de ressources. Une seule entrevue majeure (avec des dirigeants en charge des initiatives TI stratégiques) par cas a

fait l'objet du processus d'échantillonnage. Au lieu d'étudier en profondeur un petit nombre de cas, la collecte a été effectuée de manière horizontale sur un plus grand nombre de cas dans plusieurs secteurs. Les résultats doivent donc être appliqués avec précaution. Par ailleurs, le modèle final met l'emphase sur les deux pôles de gouvernance (visant l'efficience et visant l'innovation) et ne permet pas d'expliquer clairement les initiatives TI mixtes à cause des importantes variations qui existent à l'intérieur de la famille mixte et des plus faibles distinctions observées entre cette familles et les deux autres familles.

Des études futures pourraient explorer en profondeur les différents types de systèmes de gouvernance qui existent à l'intérieur de la famille d'initiatives TI mixtes ainsi qu'à l'intérieur des deux autres familles (visant l'efficience et l'innovation). Il serait aussi intéressant d'étudier les variétés d'initiatives TI exploratoires visant la croissance et la création de marché au sein d'une industrie ciblée et reconnue pour sa contribution aux innovations TI. De plus, des futures études pourraient approfondir les relations qui existent entre les différents méchanismes de gouvernance clés et faire ressortir les relations de cause à effet ainsi que des variables intermédiaires critiques.

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LIST OF ACRONYMS

AD ..... Application Development

ALM .....Asset Lifecycle Management

ARC ..... Architecture, Routines and Culture

BOB .....Best Of Breed

CIGREF ..... Club Informatique des Grandes Entreprises Françaises

CISR ..... Center for Information Systems Research

CIO .....Chief Information Officer

CM ..... Claims Management

COBIT ..... Control Objectives in Information and Related Technologies

CPM .....Critical Path Method

CRM .....Customer Resource Planning

CSSS ..... Centre de santé et de services sociaux

DDS .....Dynamic Distribution System

DSI ..... Directeur des Systèmes d'Information

ECM ..... Enterprise Content Management

EHR ..... Electronic Health Records

ERP ..... Enterprise Resource Planning

ESE ..... Electronic Stock Exchange

GT ..... Grounded Theory

IS ..... Information Systems

ISPIM ..... International Society for Professionals in Innovation Management

IT ..... Information Technology

MC .....Mass Customization

MINE ..... Managing Innovation in the New Economy

PERT ..... Program Evaluation Review Technique

PLM ..... Product Lifecycle Management

PMBOK ..... Project Management Book of Knowledge

PMI ..... Project Management Institute

PRINCE ..... Projects in Controlled Environments

RBV ..... Resource Based View

RFI ..... Request for Information

RFP ..... Request for Proposal

RV ..... Relational View

SAM ..... Strategic Alignment Model

SLA ..... Service Level Agreement

SOX ..... Sarbanes-Oxley Act

SPE ..... Sales per Employee

SSHRC ..... Social Sciences and Humanities Research Council of Canada

TCE ..... Transaction Cost Economics

VALIT ..... Value IT

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INTRODUCTION

A decade ago, the information revolution was still viewed as the sheer automation of business processes and routine work (Drucker, 2002). Today, information technology (IT) is becoming a critical element in a growing number of strategic initiatives taken by leading firms who seek for new ways to innovate and explore new markets.

This research was triggered by a series of observations made while conducting studies for an international research project at Polytechnique Montréal called MINE (Managing Innovation in the New Economy) on the innovation process of firms developing R&D and engineering IT systems. The division of labor and the outsourcing trends in the IT industry led to the creation of specialized vendors of IT systems and software, and specialized providers of IT services and consulting. Firms were no longer developing their software internally and had to increasingly rely on these specialized suppliers. The initial studies quickly showed that the software vendors and developers were still relying extensively on their customers and consulting partners for developing new systems and innovating. In fact, the paradigm shift from closed to open innovation (Chesbrough, 2003) made visible a complex network of partners in which customers and users still had a leading position. As a result, the research focus quickly shifted from the vendors to the buyers who sponsor ambitious IT projects and push for innovative IT solutions through strategic initiatives.

Today, firms sponsor and launch complex IT initiatives in collaboration with IT consultants and vendors for various reasons like the replacement of legacy systems, business transformation, the development of new capabilities, and even for market creation and growth. In order to successfully manage these innovative initiatives, buyers use approaches that lead to the development and implementation of new IT systems, which in turn leads to product innovation, market creation and growth. These emerging approaches that managers use to innovate through strategic IT initiatives are not well documented and are barely accounted for in the literature.

The initial research objective was thus to understand how firms manage and govern these strategic IT initiatives to innovate and create value in collaboration with internal and external partners. The governance concept was introduced because of the relational and alignment mechanisms observed that account for a large portion of the devices used by senior managers. Furthermore, governance provides the tools and mechanisms needed to connect organizations and stakeholders with different views and structures while allowing for flexibility and innovation. The governance approach in this thesis simultaneously tackles the intra-organizational, inter-organizational and project-based relationships as well as their links with innovation in the context of IT initiatives.

The research objective rapidly evolved to include two types of innovation and a distinction between innovative IT initiatives creating value through exploitation and efficiency on one hand, and innovative IT initiatives creating value through exploration and growth on the other.

The literature that was examined introduces pertinent concepts and insights that influenced this research but the various theoretical perspectives do not fully address the research question. In general, the literature is segmented and no model was found that fairly captures the systemic governance approaches used by senior IT managers and the distinctions between efficiency-oriented and growth-oriented initiatives.

First, IT and innovation are rarely investigated together in the literature. The few studies found do not examine the relationship between IT and innovation in project settings where open dynamics are key. In general, innovation in IT is associated to efficiency as opposed to growth and market creation.

Second, the IT management and governance literature is largely focused on intra-organizational relationships and the internal alignment of IT with corporate strategy. The new open innovation dynamics in IT initiatives that stress the inter-organizational relationships with the consultants and vendors are not widely covered. Also, the literature that focuses on IT outsourcing and inter-

organizational relationships only investigates ongoing client-supplier relationships in IT outsourcing and supply chain processes.

Third, the project management literature emphasizes the temporary and inter-organizational relationships in project settings but largely ignores the long-term intra-organizational relationships that align IT with business functions and strategy.

The qualitative theory-building approach and methodology

In innovative IT and engineering projects where complexity and uncertainty are high, the separation of the design and implementation phases can lead to developing unrealistic assumptions (Morris, 1997) and to the creation of rigid plans that limit the creativity during the delivery stage because the solution is locked-in early (Clegg et al., 2006). To avoid falling in this trap, managers use methods that induce flexibility and enable them to constantly challenge their assumptions, review their plans and improve their deliverables. In a similar way, a theory-building qualitative research methodology was adopted in the current research to explore and study the complex phenomenon of strategic and innovative IT initiatives.

The qualitative Grounded Theory (GT) approach that focuses on theory building was chosen as an underlying methodology in this research. Instead of adopting a traditional approach where pre-conceived assumptions or hypotheses are tested, the theory-building approach was used to let hypotheses emerge through a long exploratory phase and progressively converge into a coherent model. Furthermore, to structure the research and refine the analysis, the GT approach included two complementary techniques: (1) typological analysis, and (2) qualitative content analysis.

In the same way that governance is expected to help managers address the complexity and uncertainty in their management of innovative IT projects, GT can help scholars address the complexity and uncertainty in their research on innovative IT initiatives. In the GT approach used, the literature review process is conducted in parallel with data collection and analysis. A

theoretical sampling process characterizes data collection in that new cases are added until a conceptual saturation is attained.

Although the research process is highly iterative, it can be organized in two main stages: (1) an exploratory stage, and (2) an analysis stage. In the first stage, interviews were conducted with senior IT managers and the first versions of the research model were obtained. Constant iterations between the field and the theory were necessary. New interviews were conducted until conceptual saturation was attained and a stable model developed. Even though the first stage was highly exploratory, it also contained a level of analysis that enabled the theoretical sampling process. In the analysis phase that followed, the full qualitative analysis of the interviews (open and axial coding) was conducted using a specialized software tool (Nvivo), a typology of strategic IT initiatives was explored using innovation-based typologies found in the literature and the qualitative content analysis was applied to explore the links between each governance dimension and each family of IT initiatives. The literature was reviewed throughout both parts of the research to constantly test the research model and increase its theoretical sensitivity to the categories developed. In the second part, prototypes of strategic IT initiatives were selected in each family (three families emerged), the final versions of the research model were obtained, and the complete research results were unveiled.

Research findings and implications

First, the governance approach that emerged is systemic and multi-dimensional allowing managers to simultaneously coordinate: (1) project governance, (2) intra-organizational governance, and (3) inter-organizational governance. This view challenges the one-dimensional view of governance in the literature where studies focus on the exploitation side of IT strategy as opposed to its exploration side. The research results are compared to two exploitation views: (1) the intra-organizational view that focuses on IT governance and the internal alignment of IT with strategy, and (2) the inter-organizational view that focuses on ongoing IT outsourcing and supply-chain relationships. Both views are one-dimensional and largely ignore the project dynamics that are core in strategic IT initiative.

Second, the results suggest that governance is more intense and more diverse in growth-oriented initiatives. In contrast to the literature that associates governance to compliance, cost control and efficiency, the findings show that governance in strategic IT initiatives is implicitly associated more to growth and market creation than it is to efficiency. Governance allows managers to address uncertainty and prepare for the future, hence the higher levels of governance needed in initiatives where innovation is exploratory and uncertainty is higher.

Third and most importantly, the research shows that governance in strategic IT initiatives varies according to two ways of creating value: (1) exploitative innovation and efficiency, and (2) exploratory innovation. In other words, efficiency-oriented and growth-oriented initiatives are governed in two distinct ways with two distinct sets of governance mechanisms. This standpoint and typology expands the views in the literature that compare operational IT activities to strategic IT activities, or IT that aims at supporting business strategy to IT that aims at driving strategy through efficiency. The distinctions found in this research between efficiency-oriented and growth-oriented IT initiatives from a governance perspective have not been previously addressed in the literature.

Finally, the findings show that inter-organizational governance in growth-oriented initiatives is more important than intra-organizational governance because of the critical open and collaborative innovation dynamics. To build new IT-enabled capabilities and to stimulate innovation, the results show that firms emphasize open and collaborative approaches as opposed to closed and competitive approaches.

The structure of the thesis

In Part 1 the literature review (Chapter 1) and the methodology (Chapter 2) are presented. The literature review is presented in three sections with a concluding section comparing the gaps of all perspectives. In the first section, the more recent literature on IT-enabled innovation is introduced and the relevant innovation typologies are reviewed. In the second section, the governance concept is introduced and IT governance literature is presented and two theoretical

perspectives are compared: (1) the governance and strategic alignment of IT, and (2) the IT outsourcing and inter-organizational perspective. In the third section, the project management and governance literature is covered and three perspectives presented: (1) project management rethinking, (2) project governance, and (3) the IT project perspective. The final section introduces the conceptual link between governance and innovation, recapitulates the major gaps found in the literature, and highlights the important emerging and unanswered questions.

In Chapter 2, the research question and the methodology are presented. The chapter is split into five sections: (1) the research motivation and question, (2) the qualitative theory-building approach and process, (3) overview of the five phases of the research process, (4) the two exploratory and iterative phase, and (5) research methodology conclusions.

In Part 2, the research results are presented in three different chapters (Chapters 3, 4 and 5). In Chapter 3, the full qualitative analysis process is described with a focus first on the way the 18 cases were selected in the sampling process and second on the conceptual saturation process that led to the creation of the second intermediary model. In Chapter 4, the typological analysis is carried-out using the innovation-based typologies found in the literature and in turn three families of IT initiatives were created. The prototypes selected in each family of IT initiatives are introduced in this chapter. In Chapter 5, the three sets of governance mechanisms that emerged (project, intra-organizational and inter-organizational) are analyzed and the links between each one of these governance mechanisms and innovation (the three families of IT initiatives) are explored. The families and prototypes are elaborated in this chapter by exploring their distinct links with each governance mechanism in the model. Throughout this chapter, the qualitative content analysis technique is used and the frequencies of themes are measured to enhance the analysis. Additionally, excerpts from the interviews (of the prototype cases) are presented in tables to illustrate the themes.

Finally, in Part 3, the main research findings and final model are presented (Chapter 6) and the major implications and limitations of the research are discussed (Chapter 7). In Chapter 6, the

final research model is presented where the governance mechanisms are brought down to only two sets: (1) key mechanisms in growth-oriented initiatives, and (2) key mechanisms in efficiency-oriented initiatives. In Chapter 7, the research findings and final model, the theoretical and methodological implications, the research limitations, and suggestions for further research are presented. The following four major findings are presented and discussed: (1) the systemic and multi-dimensional nature of governance in strategic IT initiatives, (2) the way more intense and diverse governance systems are needed in growth-oriented initiatives (as opposed to efficiency-oriented initiatives) for innovation, growth, and market creation, (3) the significant distinctions between growth-oriented and efficiency-oriented initiatives in the way governance systems and mechanisms are used, and finally (4) the way innovation in strategic IT initiatives is open and collaborative.

PART 1: LITERATURE REVIEW AND METHODOLOGY

The Grounded Theory (GT) approach used in this research is an iterative theory-building methodology that requires sensitivity to the field under study. A complete literature review prior to data collection and analysis (Corbin and Strauss, 1990; Fernandez et al., 2002) is not required. Instead, the approach suggests conducting literature reviews in parallel to data collection and analysis and through various iterations. Thus, GT is not an excuse for ignoring extant literature and knowledge but an approach for trying to achieve a practical middle ground between a theory-laden view of the world and an unfettered empiricism (Suddaby, 2006).

CHAPTER 1: LITERATURE REVIEW

The literature review that was conducted is concept-centric (Webster and Watson, 2002). In order to link the literature to the research focus, namely the governance of strategic IT initiatives for innovation, a review of the following topics was undertaken through several iterations:

1. Innovation types and IT-enabled innovation (section 1)
2. The strategic alignment and governance of IT (section 2)
3. Project management alternatives and project governance (section 3)

Although the literature review process helped refine and narrow the research model, the research question was triggered by preliminary field observations.

This chapter is divided into the following four sections:

1. The first section (Innovation types and IT-enabled innovation) will focus first on literature that presents the various **typologies of innovation** and second on literature that makes a **link between IT and innovation**.
2. The second section (IT governance and alignment) will focus on the major IT governance and alignment approaches and will provide **definitions of the governance concept**.

3. The third section (Project management alternatives and project governance) will present the literature showing strong **needs for alternative project management approaches** with a focus on **project governance** as one alternative approach.
4. Finally, the fourth section will conclude with the **conceptual links between governance and innovation** in the literature and their relevance. It will also cover the major gaps in the theoretical fields that the current research will attempt to bridge.

1.1 Innovation types and IT-enabled innovation

The purpose of this section is twofold: (1) explore the existing definitions and typologies of innovation in general, and (2) map out the current understanding of the relationship between IT and the various types of innovation. Simply put, the literature will help determine the typology of innovation on the basis of which the IT initiatives will be grouped in families and compared from a governance perspective.

1.1.1 Innovation types and perspectives

No universally shared conceptualization or operationalization exists for innovation (Amara and Landry, 2005; Markides & Anderson, 2006). The innovation performance of companies has been studied for a long period of time but the results of previous studies have not yet led to a generally accepted indicator of innovative performance or a common set of indicators (Hagedoorn and Cloodt, 2003).

Micro (firm) level innovation

Although several approaches to studying innovation have been introduced since Schumpeter[1](1934) founded the field, his original typology still remains today as one of the major ways of differentiating between types of innovation on a firm level. The typology uses four types of innovation on the basis of the object of change: (1) process, (2) product, (3) market,

[1] Schumpeter's 1934 book on the theory of economic development focused on the entrepreneurial approach to innovation also promoted by authors like Hamel (2000).

and (4) organization. The OECD (2005a) has recently reintroduced and defined these four types of innovation in the following way:

- *Product innovation is a new or significantly improved good or service, which is released onto the market for the first time; but may have already been available on the market.*
- *Process innovation is the implementation of a new or significantly improved production process, distribution method or support activity for firms' goods or services.*
- *Market innovation is a new or significantly improved good or service, which is released onto the market before a firm's competitors; however, it may have already been available in other markets.*
- *Organizational innovation is the introduction of significantly changed organizational structures, advanced management techniques or new or substantially changed corporate strategic orientations.*

The other way of differentiating between types of innovation in the firm is along the radical-incremental axis, the extent of change brought to the object. Moreover, Schumpeter (1934) characterized radical innovations with the concept of "creative destruction", and Christensen (1997) expanded Schumpeter's concept with "disruptive innovations".

Firm-level innovation factors have also been addressed in the resource-based view (RBV) of the firm where the effects of internal innovation capabilities and competencies on competitive advantage are examined (Penrose, 1959; Teece et al., 1997; Saloner et al., 2001; Barney and Clark, 2007). These hard to imitate organizational innovations can lead to process, product, and market innovations, which in turn lead to competitive advantage. This view of business strategy focuses on organizational factors as opposed to the position of the firm in its competitive environment and market (Bain, 1956; Porter, 1980). To build the firm's internal innovation capability, Pavitt (2005) suggests using three types of overlapping innovation processes: (1) cognitive, (2) organizational, and (3) economic. These three types of innovation processes can be seen as sub-categories of organizational innovations.

More recently, authors introduced a new organizational typology of innovation using the notion of exploration and exploitation (Jansen et al., 2006), based on studies of organizational decision-making and strategic management (March, 1997; Shapira, 1997; Saloner et al., 2001). This typology is an extension of the incremental-radical typology. Exploitative innovation is found in units building on existing knowledge and extending existing products for existing customers whereas exploratory innovation is found in units pursuing new knowledge and the development of new products for emerging customers (Jansen et al., 2006).

Drawing upon the opposing concepts of exploration and exploitation in strategy, a typology comparing innovation to efficiency can be used. The exploitative forces that lead to process innovations and in turn to more efficiency and cost reduction (bottom line) can be opposed to the exploratory forces that lead to product and market innovations (top line). The notions of innovation and efficiency have been recently used for example in a study on the determinants of design decision-making in the fashion industry (Abecassis-Moedas and Benghozi, 2012). This typology was also found in studies of IT value and IT-enabled innovation seen later in this section.

Meso (network) level innovation

The other sets of innovation typologies are the meso level perspectives that take into account the inter-organizational dynamics that become important determinants of the innovation process in the various networks and clusters throughout industries.

The first meso-level typology compares open and collaborative innovation to closed innovation. This approach studies the dynamics and processes that drive co-innovation and describes a major paradigm shift where through open R&D and networks of partners a firm's innovation capabilities becomes more dependent on its ability to combine ideas, knowledge and capabilities from its external environment (Brandenburger & Nalebuff, 1996; Gawer & Cusumano, 2002; Chesbrough, 2003; Iansiti and Levien, 2004; Olleros, 2007). The perspective opposes the micro-

level and linear NPD model[2] that focuses on the management of internal R&D processes in a closed fashion.

This open-closed typology is important for the study of strategic IT initiatives because it determines the extent to which open or inter-organizational relationships are leveraged and linked to the innovation outcome for the buyer of the new IT system. Furthermore, literature suggests that collaborative software-intensive initiatives have serious implications for a firm's capability to manage knowledge and IP and to innovate (Chesbrough[3], 2003; Hopkins, 2010). Also, the complex systems approach to innovation (Williams and Edge; 1996; Hobday, 1998; Bar-Yam, 2002) is similar in that it focuses on the evolutionary inter-firm processes in large technology and engineering projects. The approach[4] stresses the rules promoting co-innovation, user involvement and modularity.

A meso-level typology relevant for the current research is the one developed by Miller and Olleros (2007) that challenge the conventional one-size-fits-all approach to innovation that emphasizes internal R&D, closed systems and self-contained artifacts, and assumes that markets are exogenous and pre-existing. According to the authors, innovation theories have difficulties coping with the variety of innovation forms, hence the pertinence of using a two-dimensional typology to characterize the variety of "games of innovations" that display different innovation logics and dynamics[5]. The two dimensions used are (1) value creation (or product architecture),

[2] The NPD process typically has seven stages: (1) idea generation, (2) idea screening, (3) concept development and testing, (4) business analysis, (5) beta testing and market testing, (6) technical implementation and (7) commercialization. The alternatives are progressively reduced throughout the process until one final idea is selected and fully developed. The NPD process is a rational and incremental cost-benefit analysis process.

[3] Chesbrough (2003) identifies the following four key factors that eroded the underpinning of closed innovation: (1) the increasing availability and mobility of skilled workers, (2) the venture capital market, (3) external options for ideas sitting on the shelf, and (4) the increasing capability of external suppliers.

[4] The major themes that emerge from the complex systems approach include: (1) the need for important coordination mechanisms in multi-firm settings, (2) the importance of active user involvement in complex system development, (3) the need for a capability that deals with feedback loops in all stages of a project, (4) limited detailed planning and limited central control provide flexibility, (5) trust and cooperation are more important than contracts in complex systems, (6) strong project management capabilities, and (7) modularity and task division in projects.

[5] The games of innovation concept was developed in the MINE program at Polytechnique Montréal between 2004 and 2008 and the current research project has served the program in providing relevant meetings, interviews and surveys with senior managers around the world.

and (2) market evolution. The first dimension is divided in three major types: (1) stand-alone products, (2) integrated systems, and (3) open modular products. The second dimension is divided in two major types: (1) market creation, and (2) market evolution.

Drawing upon the typology of games of innovations (Miller and Olleros, 2007; Miller and Olleros, 2008), the strategic IT initiatives in this study can be placed on the second type of product architecture (integrated systems) and on both types of market evolutions. This meso-level typology is similar to the micro-level typology using the notion of exploitation and exploration in that innovations can either lead to the improvement of existing products, cost-efficiencies and the exploitation of existing markets or to the development of new products and the exploration or creation of new markets. This research helps characterize two games of innovation that fall in the integrated systems architecture on the value creation axis: (1) one that extends the current market for IT systems by integrating the system in a new organization leading to process innovation and efficiency, and (2) one that creates a new market for new IT systems by co-developing the new system with the buyer with the intention of commercializing the outcome.

In sum, the typologies found in the innovation literature provide guidelines for structuring the current research and for comparing the various types of strategic IT initiatives. The typologies found can be brought down to two relevant typologies for the current study: (1) Schumpeter's typology used by the OECD (2005a) that splits innovation in four types: process, product, market and organizational, and (2) the typology that opposes exploitation and market evolution on one hand to exploration and market creation on the other.

In the next section, innovation typologies in the context of IT and the studies that link IT to innovation will be explored.

1.1.2 IT-enabled innovation

Research that examines the relationship between IT capabilities and innovation is relatively new. Not so long ago, IT-enabled innovation was seen as an emerging phenomenon with little or no prior theoretical studies or frameworks on which to base research questions (Fernandez et al., 2002). IT is still often regarded as primarily valuable for operational efficiency and cost reduction as opposed to innovation (Carr, 2003). The benefit of IT in keeping companies innovative is rarely mentioned (Gordon and Tarafdar, 2007) and many managers believe information systems still hamper innovation and build barriers to creativity and productivity because traditionally IT systems are designed to impose structure on processes (Gordon and Tarafdar, 2010). Nevertheless, a growing number of studies are now addressing the issue, suggesting various links between IT and innovation and reinforcing the relevance of the current research. For instance, surveys conducted by CIGREF (Club Informatique des Grandes Entreprises Françaises) and Mckinsey (CIGREF and McKinsey & Company, 2008) and Capgemini Consulting (2008) show that a growing number of CIOs believe their IT functions contribute simultaneously to operational excellence and business innovation. These industry studies focus on the strategic role of the CIO, intra-organizational processes, and the importance of collaboration between the IT function and the rest of the business. A comparison of both surveys is presented in the appendix.

While most companies have experience in managing IT for efficiency, speed and business responsiveness, far fewer know how to harness IT-enabled business innovation for competitive advantage (Marwaha and Willmott, 2006).

Most of the early research linking IT to innovation is found in the services industry (Miles, 2005) and highlights the ability of IT to create modularity in business processes and in turn to facilitate innovation. Barras (1986, 1990) suggested that in contrast to the classic product cycle in manufacturing, that IT-based innovations in services follow a reverse product cycle (RPC) in three steps: (1) improved efficiency, (2) improved quality, and (3) new services. Venkatraman (1994) then introduced a typology composed of two major levels of internal business

transformation or process innovation: (1) an evolutionary level, and (2) a revolutionary level. The evolutionary level starts with localized exploitation and the revolutionary level ends with business scope redefinition. Unfortunately, the model largely focuses on IT-enabled efficiency and ignores the open and collaborative dynamics in project-based settings that lead to product and market innovations. Venkatraman's research developed into the field of IT strategic alignment that is presented in the next section with IT governance and that largely focuses on intra-organizational relationships.

Quinn et al. (1996) filled the gap in Venkatraman's model by exploring the effect of software on product innovation. According to the authors, software provides critical mechanisms to enhance innovation in the following ways: (1) basic research, (2) applied research, (3) development (CAD/CAM), (4) manufacturing engineering, (5) interactive customer design, (6) post-introduction monitoring, (7) diffusion and organizational learning, and (8) new added-value systems. Other authors have focused on IT-enabled product innovation or the way IT drives research and development and the NPD process. Seidman & Ritsko (2005) looked at the way IT innovations are critical in pushing the frontiers of product research and development, especially in research-intensive fields. Song and Song (2010) studied the way IT increased the levels of R&D-marketing integration and in turn the likelihood of NDP success, and, ultimately, firm success. They found that IT could be used to reduce the negative impact of physical separation, goal incongruity, and cultural differences on R&D-marketing integration.

More recently, Hopkins (2010) suggested that leaders drive innovation through IT in the following way: (1) measurement improvement (business intelligence), (2) experimentation and customer interactivity, (3) idea sharing through business functions and units, and (4) replication. Gordon and Tarafdar (2010) proposed a capability-based typology for IT-driven product innovation including six types of IT enabled innovation capabilities: (1) portfolio management of innovation projects, (2) collaboration capabilities that rely on communication tools, (3) knowledge and information management, (4) business-IT linkage capability, (5) ambidexterity of IT staff, and (6) competitive intelligence.

Using Schumpeter's innovation typology used by the OECD (2005a), the studies presented above (Quin et al., 1996; Seidman and Ritsko, 2005; Song and Song, 2010; Hopkins, 2010; Gordon and Tarafdar, 2010) focus on IT-enabled product innovation as opposed to IT-enabled process, market or organizational innovation. They cover the way IT drives and enhances the various processes in the organization (and organizational capabilities) that lead to product innovation. In other words, they use product innovation as the central dependant variable.

More holistic and encompassing studies that situate IT in the context of all types of innovations are almost nonexistent. Prahalad and Krishnan (2002) used the efficiency-innovation typology (exploitation-exploration) applied by Miller and Olleros (2007) and inspired by strategic management research (March, 1997; Shapira, 1997; Saloner et al., 2001) to manage IT applications for innovation. They divided the firm's applications in two categories: (1) systems that provide support for innovation, experimentation and flexibility, and (2) systems that provide support for efficiency and standardization. The more evolving and dynamic the domain that the IT-application supports, the more the system can enable innovation (as opposed to efficiency).

Marwaha and Willmott (2006) introduced a three-level typology for IT-based value creation including: (1) managed for scale, (2) rapid development for competitive advantage, and (3) IT-enabled business innovation. Using Schumpeter's innovation typology, the first level (managed for scale) considers the integration standard business processes and process innovations, and leads to cost reduction and more efficiency. The second level (rapid development for competitive advantage) includes process innovations directly linked to new product development and incremental product innovations. The third level (IT-enabled business innovation) has a rule-changing and disruptive effect leading to market innovations or radical product innovations for the firm. The third level includes cases where new innovations are explored outside of business where a higher level of risk is accepted. Similarly, Weeks and Feeny (2008) studied the effect of IT outsourcing relationships on the following three types of IT-enabled innovations: (1) IT operational innovations, (2) business process innovations, and (3) strategic innovations. The first type includes the integration and automation of existing business processes, low levels of process innovations, cost reduction and efficiency. The second type here includes high levels of process

innovations (through the integration of new ERP systems for example) that lead to high levels of efficiency. The third level includes radical product innovations and new market creation.

The table below compares the four most relevant studies found of IT-enabled innovation with regards to the three major innovation typologies in the literature.

Table 1-1 Innovation typologies applied in studies of IT-enabled innovation (cont'd)

	Typology 1: (1) Process, (2) product, (3) market and (4) organizational innovations	**Typology 2:** (1) Incremental (exploitative, leading to efficiency) and (2) radical (exploratory, leading to innovation)	**Typology 3:** (1) Closed and (2) open innovations (intra-organizational and inter-organizational)
Prahalad and Krishnan (2002)	- Applications in stable domains lead to process innovations and in turn to efficiency. - Applications in dynamic domains lead to product and market innovations. - Organizational innovations are largely ignored.	- All applications in the firm can be divided in two groups using this typology: (1) the stable group managed for efficiency, and (2) the dynamic group managed for innovation.	- The study focuses on closed innovation processes, it does not distinguish between intra-organizational and inter-organizational processes or relationships.
Marwaha and Willmott (2006)	- The first level focuses on cost reduction and efficiency. - The second level includes process innovations that lead to product improvements. - The third level includes product innovations and market creation. - Organizational innovations are found in the IT-outsourcing relationship.	- The first and second levels include incremental innovations (process and product respectively). - The second and third levels include radical innovations (process and product respectively). - The first level focuses on efficiency and exploitation while the third level focuses on innovation and exploration. The second level is a mix of both.	- The open inter-organizational relationships are largely ignored. - No distinction is made between closed and open innovation (or the closed and open relationships leading to innovation).

Table 1-1 Innovation typologies applied in studies of IT-enabled innovation (cont'd and end)

Weeks and Feeny (2008)	- The first level includes low-level process innovations and cost-efficiencies. - The second level includes high-level process innovations and efficiency. - The third level includes radical product innovations and market creation. - Organizational innovations are largely ignored.	- The first and second levels include incremental innovations (process and product respectively). - The second and third levels include radical innovations (process and product respectively). - The first level focuses on efficiency and exploitation while the third level focuses on innovation and exploration. The second level is a mix of both.	- The authors study open innovation from an IT outsourcing perspective. - Ongoing IT outsourcing relationships are taken into account and linked to the three levels of innovation (operational, business and strategic). - No distinction is made between closed and open innovation.
Gordon and Tarafdar (2010)	- The authors largely focus on product innovations (as opposed to process and market innovations). - The capability-based model presented includes six types of IT-enabled capabilities leading to product innovation. These capabilities can be seen as IT-enabled organizational innovations.	- The study does not distinguish between exploitation (efficiency oriented) and exploration (innovation oriented). Instead, it focuses on growth-oriented IT activities and capabilities. - Similarly, the studies by Quin (1996), Seidman and Ritsko, (2005), Song and Song (2010), and Hopkins (2010) have not made the distinction between efficiency and innovation.	- The IT-enabled organizational (capabilities) are focused on the inside of the firm and intra-organizational relationships. - No distinction is made between closed and open innovation.

Even though the literature indicates that three of the four types of innovation (in the first typology) are used to gauge the effects of IT on innovation (process, product and market), it appears that the innovative outcome of IT activities can be brought down to the two types in the second typology: (1) exploitative and efficiency-oriented, and (2) exploratory and growth-oriented. In the context of IT, the fourth type of innovation in the first typology (organizational innovations) is generally defined as an independent variable and presented as a set of organizational capabilities or governance mechanisms developed by leading firms to drive innovation through IT.

Furthermore, the above table shows that extant literature in IT-enabled innovation does not distinguish between closed and open innovations or the intra-organizational and inter-organizational processes and relationships leading to innovation. In general, the literature focuses on intra-organizational factors. Also, authors who studied inter-organizational relationships (Weeks and Feeny, 2008) looked at ongoing client-supplier relationships as opposed to project-based relationships with IT consultants and vendors.

None of the studies found in IT-enabled innovation have chosen the IT initiative or project as their research object (where uncertainty is higher and innovation more radical and exploratory). This is probably why there is no distinction made between closed (intra-organizational) and open innovation (inter-organizational).

The industry surveys reviewed (CIGREF and McKinsey & Company, 2008; Capgemini Consulting, 2008) also show that IT-enabled innovation and value creation is still associated to closed innovation and intra-organizational processes and mechanisms as opposed to open innovation and inter-organizational processes and mechanisms. These surveys do not capture the role of external networks and partnerships in the innovation process. Furthermore, these surveys emphasize process innovation (and in turn efficiency) as opposed to product and market innovations.

1.2 The governance of IT

The purpose of this section is to explore the various definitions of the governance concept and to analyze the different types of IT governance mechanisms found in the literature that are relevant for the current research. In other words, this section will explore the extent to which governance is perceived in the literature as a way to create value and enable innovation in the context of IT.

This section is organized in three parts. In the first part, the general governance concept is introduced and defined. In the second part, the IT strategic alignment literature is introduced (the predecessor of IT governance) and the various IT governance definitions are compared with a focus on the types of governance mechanisms used in IT management. Also, the governance mechanisms used in the major IT governance frameworks will be analyzed (COBIT and ValIT). In the third part, literature that studies IT outsourcing relationships including the relational governance concept found in supply-chain relationships will be presented. Relational governance (in inter-organizational settings) is an important concept of the relation view (RV) that is presented as an extension to the RBV (Resource-Based View).

1.2.1 The concept of governance

In this section, the definitions of governance are presented first and the conceptual positioning of governance in the field of strategy in comparison to organizational capabilities is presented second.

Governance in general

The growing interest in governance reflects the recent reorientation of several disciplines attempting to understand the fundamental changes in the government-market-firm relationships (Hollingsworth and Boyer, 1997; Boyer, 2004). In general, governance in policymaking is seen as the evolutionary rules, structures and mechanisms that allow for public and private actors to coordinate their work in an autonomous way without the need for constant government authority and control (Rhodes 1996; Stoker, 1998; OECD, 2005b). Governance capabilities are defined as

the ability (Ohler et al., 2005): (1) to recognize system characteristics (strengths, weaknesses, problems, etc.), and (2) to define the focus and the topics for political action (agenda setting).

Governance is a broad concept that applies to institutional and organizational levels. On a macro level, governance applies to international organizations like the UN, WTO, and OECD, and to national organizations. On a meso level, governance applies to industries, company networks, and project settings. And finally on a micro level, governance can apply to a single firm or even to a single function in a firm like IT. Corporate governance stems from two key theories: (1) the agency theory or principal-agent dilemma (Jensen, 1986), and (2) the transaction cost theory (Williamson, 1985). The core issues in corporate governance are (1) managerial accountability, (2) incentive systems, and (3) the rules and principles needed to induce desired managerial behaviors.

Governance mechanisms in IT clarify processes and accountabilities so that managers throughout the firm can make decisions that induce desirable behaviors (Weill and Ross, 2004). As previously seen in the literature on IT-enabled innovation, a few authors regarded governance mechanisms as key enablers for innovation (Weeks and Feeny, 2008; Gordon and Tarafdar, 2010).

Governance is also an alternative perspective to the hyper-rational decision-making methods (Simon, 1987; March, 1997; Shapira, 1997; Mintzberg, 1989; Geslin, 2006). Miller and Lessard (2001) argue that instead of scenario planning (Courtney et al., 1999) and options theory (Fichman et al., 2005), project governance mechanisms can be used to structure relationships in project settings and allow for flexibility and innovation. Project governance is covered at the end of this chapter.

Governance, strategy and organizational capabilities

Governance is an emerging concept in the field of strategic management that captures higher-level decision-making mechanisms (processes, structures and communications). The concept has

a lot in common with the resource-based view (RBV) and organizational capabilities in that it addresses organizational routines and processes, decision and authority structures, formal and informal rules, as well as competencies and HR management processes. Yet, governance is different because it provides the mechanisms needed for managing higher levels of uncertainty and change. In the literature, authors persistently interchange the concepts of governance and organizational capabilities. The literature does not provide a clear distinction between the concepts of governance and organizational capabilities.

Strategy is the practice of balancing exploration and exploitation for value creation and capture, driven on the long run by a sustained competitive advantage (Saloner et al., 2001) along with the task of effective organizational decision making (Drucker, 1985; Lant and Shapira, 2008).[6] Exploration is associated to Porter's competitive strategy (Bain, 1956; Porter, 1980), the firm's position in a network and its inter-organizational relationships. Exploitation on the other hand is associated to the resource-based view (RBV) and the firm's internal capabilities (Teece et al., 1997; Eisenhardt and Brown, 1998; Hamel and Prahalad, 1999; Saloner et al., 2001; Barney and Clark, 2007). In turn, governance can be defined as the effective decision-making system that drives a desirable behavior for both exploration and exploitation (as opposed to only exploitation).

IT governance (to be seen later in this section) is composed of decision structures, alignment processes (or relational processes), and formal communications (Weill and Ross, 2004; De Haes and Van Grembergen, 2004). In contrast, organizational capabilities, or the processes that exploit the firm's rare and inimitable resources, include reporting structures, management control systems, and compensation policies (Barney and Clark, 2007). Furthermore, Saloner et al. (2001) define organizational capabilities in their ARC (Architecture, Routine and Culture) model as a

[6] Lant and Shapira (2000, 2008) identified two similar decision-making processes, (1) the economist's rational decision-making process that functions with expectations and market knowledge, and (2) the manager's experience and aspiration based decision-making process. Strategy can also be split into these two poles: (1) the entrepreneurial pole where performance is the fruit of intuition, gut feeling, aspirations and practical intelligence (low rationality), and (2) the rational pole where the engineering mindset dominates decision-making with quantitative planning and analytical tools (over prediction).

combination of organizational routines, authority structures, and formal and informal rules. Four major RBV models are compared in the appendix.

Although governance and organizational capabilities have a lot in common, both concepts differ in that governance focuses on higher-level alignment and horizontal processes that connect various functions, units or organizations while organizational capabilities include the vertical reporting /authority structures and compensation systems within the boundaries of a single function, unit or organization. While the governance approach is used in highly uncertain and turbulent environments for exploration (large innovative projects), the RBV is generally used in intra-organizational contexts for exploitation and efficiency (dependent on path dependencies and the utilization of current assets).

IT-related organizational capabilities and IT-related governance mechanisms are similar in that they represent organizational changes that can affect process, product and market innovation and in turn competitive advantage. The distinction between both types of organizational innovations is in the level of affected change and innovation. While organizational capabilities can lead to incremental process, product and market innovations, governance mechanisms can lead to more radical process, product and market innovations. In other words, governance can be effective in managing the front-end exploratory process in strategy whereas organizational capabilities can be more effective in managing the exploitative processes in strategy.

1.2.2 The strategic alignment and governance of IT

Even though IT has evolved from its traditional orientation of administrative support toward a more strategic role within the organization, few frameworks existed with which to understand the potential of IT (Henderson and Venkatraman, 1993, 1999). Consequently, researchers started to investigate the value of IT and its link to business strategy, and the fields of IT alignment and IT governance emerged.

Both, the strategic alignment of IT and the governance of IT have a similar aim; to align IT strategy with corporate strategy or in other words to create value through IT by linking decision-making processes in IT with the rest of the business. The distinction between both fields lies in the levels of alignment processes. The governance of IT (as opposed to the strategic alignment of IT) focuses more on the higher-level strategic factors that are needed to address exploratory decision-making processes as opposed to exploitative decision-making processes.

The strategic alignment of IT

The literature on IT-enabled innovation seen earlier examines the relationship between IT and the various types of innovation namely, process, product and market innovation. In contrast, the strategic alignment of IT focuses on the link between IT and process innovation: it stresses the creation of agility in IT (modularity) to support strategy and enhance efficiency. IT here is seen as a major capability for exploitation and execution as opposed to exploration.

The impact of enterprise systems on organizations is important. However, they can culminate in failures and disastrous losses if senior managers are not aware of the logic imposed by such systems on strategy, culture and organization (Davenport and Brooks, 2004). Recently, authors proposed frameworks for developing the internal IT capabilities and enterprise architecture for strategic alignment and effective execution (Henderson and Venkatraman, 1999; Raymond et al., 2002; Feld and Stoddard, 2004; Ross et al., 2006).

The strategic alignment of IT is about the organization's information-processing capabilities needed to execute the strategy's information-processing requirements (Raymond et al., 2002). The strategic alignment also termed "fit" (Porter, 1996), "integration" (Weill and Broadbent, 1998), "fusion" (Smaczny, 2001) and "linkage" (Henderson and Venkatraman, 1993, 1999), concerns the integration of strategies relating to the business and its IT systems (Avison et al., 2004). The traditional ways for looking at the relationship between IT strategy and business strategy are (1) the dependence approach that looks at IT as any business function (marketing, finance, production, etc.) and (2) the impact approach that looks at IT as more determinant of

strategy execution and thus having greater importance (Raymond et al., 2002). In IT governance (presented later in this section), the dependence and impact approaches are called defensive and offensive respectively (Nolan and McFarlan, 2005).

Henderson and Venkatraman (1993, 1999) proposed a Strategic Alignment Model (SAM) where alignment is no longer limited to the integration of business and IT domains but extends to the alignment of external and internal domains of IT (looking at the competitive IT market). Raymond et al. (2002) recently reintroduced this holistic co-variation approach. The core focus of these approaches is on how firms can leverage technology to differentiate their operations from their competitors with internal capabilities (as opposed to external or inter-organizational capabilities). Henderson and Venkatraman (1993, 1999) introduced the external domain of IT (the IT marketplace) in their SAM model but the model still focuses on the internal alignment capabilities and does not study inter-organizational relationships. Their external perspective is competitive and looks at the position of IT in the IT marketplace and competitive landscape as opposed to inter-organizational capabilities and collaboration.

Three major IT business alignment models (Ross et al., 2006; Feld and Stoddard, 2004; Venkatraman, 1994, 1997) are compared in the table below.

Table 1-2 Major IT capability models for strategic alignment (cont'd)

	Venkatraman (1994, 1997)	**Feld and Stoddard (2004)**	**Ross et al. (2006)**
Focus of model	- To transform their organizations managers need to build IT capabilities that mature gradually through 5 stages. - Once firms have gone through the evolutionary process to maximize efficiency of current processes and functions through digitization they can jump to a revolutionary process for business integration and horizontal process reengineering.	- Making IT work demands inspired leadership, superb execution, motivated people, and the thoughtful attention of senior management. - Projects costs soar because individual teams are isolated instead of harnessed together. - There are interdependent and universally applicable principles for executing IT effectively and that it is top management's responsibility to understand and help apply them.	- How can commitment, structure and process predictability create agility for better business execution and performance? - The solution is in enterprise architecture: the project-by-project building of digitized routine tasks and their interconnectivity.

Table 1-2 Major IT capability models for strategic alignment (cont'd and end)

Major phases	Venkatraman proposes a model with two major phases and five stages: - Evolutionary: 1. Localized exploitation 2. Functional integration - Revolutionary: 3. Business process reengineering 4. Horizontal / network process reengineering (integration) 5. Virtual organization	The authors propose a 3-gears model with a complementary effect on performance: 1. Gear 1: A long-term IT renewal plan linked to corporate strategy: instead of short-term silver-bullet solutions. 2. Gear 2: A simplified, unifying corporate technology platform: business integration, central architecture, from silos to a layered architecture, etc. 3. Gear 3: A highly functional performance-oriented IT organization: a cohesive culture with a clear-cut set of rules.	The enterprise architecture develops through four stages: 1. Business Silos: localized exploitation and functional integration. 2. Standardized Technologies: standardized interfaces, databases, programming languages, middleware, etc. 3. Optimized Core: integration and standardization of business processes 4. Business Modularity: plug-and-play business process modules are developed and interconnections are easy.
Key findings	- Both risks and benefits increase from stage to stage. - New values are created in the revolutionary process. - There's a fundamental rupture in the knowledge and capabilities needed in the revolutionary process.	- Discipline and simplicity lead to speed, efficiency and alignment of IT with the business goals. - New technologies (middleware, databases, etc.) enable the transformation of the silo-based architecture to a layered architecture where all applications interconnect. - With outsourcing and offshoring, management complexity rises and the three gears become even more critical.	- The enterprise architecture model illustrates how IT capabilities evolve and mature throughout the four stages and how this can have a positive impact on business process efficiency, business integration and execution performance. - The architecture has to be simplified, controlled and constantly improved for agile execution.

As Ross et al. (2006) put it; the foundation for execution is the automation of routine tasks so those tasks are performed reliably and predictably without requiring any thought. This is achieved through the enterprise architecture where management defines: (1) the level of integration of business processes across the firm and (2) their level of standardization. Once the core business processes are optimized on standard technologies, modularity creates a platform for process experimentation and innovation. This in turn creates a powerful execution capability. The authors here talk about process innovation (driven by IT) as opposed to product innovation.

The most important benefits firms can extract from IT come from radical business model transformations enabled by IT initiatives (Venkatraman, 1994, 1997) and the risks associated with IT initiatives increases with the radicalism of the associated transformations (St-Amant and Renard, 2004). Even though the authors agree that IT-based business transformations happen in through initiatives (projects), they do not account for the specificities of project dynamics and determinants.

Henderson & Venkatraman (1993, 1999) introduced the concept of IT governance in a way that differs from what is found in the IT governance literature (seen later in this chapter). They defined the links between business strategy and IT strategy along the following three dimensions: (1) technology scope, (2) systemic competences, and (3) IT governance. The dimension of IT governance for them characterizes the relationships in the strategic IT partnerships and alliances. Their view of IT governance aligns more with the concept of relational governance (inter-organizational) than with the concept of IT governance (both governance concepts are seen later in this section).

Most of the authors who focus on the strategic alignment of IT and internal capabilities emphasize the ongoing development of IT capabilities for business integration, business process reengineering and the creation of flexible and modular IT-enabled enterprise architectures. Most authors chose the resource-based view (RBV) and organizational capabilities (Barney and Clark, 2007) as opposed to the competitive strategy perspective (Bain, 1956; Porter, 1980). They did so because of the way IT is used to enhance the firm's competitiveness through its internal and relational organizational capabilities. Even though Porter's market approach was combined to the RBV approach in some studies (Henderson and Venkatraman, 1999), its use in IT strategy and governance faded and is currently almost non-existent. In contrast, the collaborative approach in strategy (Chesbrough, 2003; Chakravorti, 2003; Brandenburger and Nalebuff, 1996) that focuses on co-innovation and strategic partnerships is highly relevant for the current research and has been barely explored for understanding the alignment of inter-organizational relationships and their effects on business innovation.

The governance of IT

IT governance comes from the fusion of the fields of corporate governance and the strategic alignment of IT. The concept emerged right after Y2K when boards realized the dependence of corporate strategy on IT. Senior managers saw that their approach to managing IT had to change; they had to stop seeing IT as a cost center and begin managing IT as a driver for value creation, growth and business transformation. As a result, a group of researchers, including those of the CISR (Center for Information Systems Research) at MIT Sloan, started to investigate and develop the new concept (De Haes and Van Grembergen, 2004; Weill and Ross, 2004; Nolan and McFarlan, 2005).

IT governance still does not exist per se in most companies because board members lack the fundamental knowledge to ask intelligent questions about IT (Nolan and McFarlan, 2005). Managers are increasingly aware that IT-related decisions and behaviors must be aligned with organizational performance goals (Weill and Ross, 2004). Different definitions of the concept of IT governance were found in the literature and are compared in the following table:

Table 1-3 Major definitions of IT governance (cont'd)

Authors	**Definitions**

UcedaValez (2009)	- IT governance provides the strategic efforts that ensure value.
	- IT governance should answer the following questions:
	  o What factors assist in measuring value in IT?
	  o Is it improved ROI, improved efficiency (reported by other internal functions in the business) or improved company morale?

IT Governance Institute (2008)	- IT Governance consists of the (1) leadership, (2) organizational structures and (3) processes that ensure that the enterprise's IT sustains and extends the organization's strategies and goals.
Williams et al. (2008)	- IT governance is the link between strategy and IT management - IT governance has a very heavy compliance angle in the US and is more value and performance based in Europe and the UK - IT governance can only exist if the CIO is on the board of directors; the CIO should not be reporting to the CFO (which is still the case in many companies) - IT governance success factors are as follows: (1) a proper organization, (2) good procedures, (3) business cases, (4) portfolio management, (5) standards and best practices (COBIT), (6) tools to support your IT governance efforts, and (7) life cycle maintenance.

Table 1-3 Major definitions of IT governance (cont'd and end)

Weill and Ross (2004)	- IT governance is the process by which firms align IT initiatives with their performance goals and assign accountability for actions and their outcomes. - IT governance is the decision rights and accountability framework for encouraging desirable behavior in the use of IT. - Governance mechanisms clarify processes and accountabilities so that managers throughout the company can make decisions that induce a desirable behavior.
De Haes and Van Grembergen (2004)	- The leadership and organizational structures, processes and relational mechanisms that ensure that an organization's IT sustains and extends its strategy and objectives. - IT governance is the organizational capacity exercised by the Board, executive management and IT management to control the formulation and implementation of IT strategy and in this way ensure the fusion of business and IT. - Determining the right combination of mechanisms is a complex endeavor and it should be recognized that what works for one company does not necessarily work for another.

In general, the alignment of IT with the business is seen as a core element of IT governance (De Haes and Van Grembergen, 2004) and not the other way round. Also, IT governance focuses on the high-level alignment decision-making processes that corporate strategy needs in more uncertain and exploratory situations. In other words, IT governance focuses on the exploratory and strategic front-end of IT (found in strategic IT projects) as opposed to its exploitative processes (covered by the IT alignment literature).[7]

In order to do justice to this approach, three IT governance frameworks developed by major authors (De Haes and Van Grembergen, 2004; Weill and Ross, 2004; Nolan and McFarlan, 2005) and two major industry standards (COBIT and ValIT) were analyzed and compared. The following table presents the core elements of the three IT governance approaches with important implications for the current research:

7 Even though IT governance has an important compliance component, the current research will instead focus on the various structures, processes and mechanisms to sustain innovation (expanding the value creation component of IT governance).

Table 1-4 Core elements of major IT governance approaches

Authors	Core elements
Nolan and McFarlan (2005)	- IT governance assists senior managers in driving technology decisions. In turn, costly projects tend to remain under control, and the firm can carve out competitive advantages. - In their IT governance model the board's role is defined according to two strategic issues: 1. *Defensive IT*: The extent to which the firm relies on cost-effective, secure and mission critical operating IT systems 2. *Offensive IT*: The extent to which the firm relies on IT for its competitive edge through systems that provide new value-added services and products or high responsiveness to customers
Weill and Ross (2004)	- The authors divide their model into 3 types of governance mechanisms: 1. *Decision-making structures*: The committee is the most common and visible structure; it is mostly present in firms where centralization is average and enterprise-wide synergies are produced. 2. *Alignment processes*: Processes for using IT effectively like IT investment proposal processes, service level agreements, and project tracking bring everybody on board by providing input into governance decisions while formalizing the process of implementation of those decisions. 3. *Formal communications*: Communication mechanisms are used to "spread the word" about IT governance decisions and processes, and about the desired and expected behavior. These are communication examples they provide: (1) senior management announcements, (2) formal committees, (3) office of the CIO, (4) office of IT governance, (5) working one-on-one with nonconformists, (6) web-based portals, etc.
De Haes and Van Grembergen (2004)	- Maturity models (COBIT and ITIL), strategic alignment models (SAM), and scoring techniques in strategy (Balanced Scorecard and Information Economics) can be integrated in one IT governance framework. - The framework proposes a set of governance mechanisms that are composed of a variety of structures, processes and relational mechanisms: 1. *Structures (IT executives and accounts, and committees and councils)*: (1) Roles and responsibilities, (2) IT organization structure, (3) CIO on board, (4) IT strategy committee, (5) IT steering committee(s) 2. *Processes (strategic IT decision-making and strategic IT monitoring)*: (1) Strategic information systems planning (SAM), (2) Balanced (IT) scorecards, (3) Information economics, (4) Service level agreements, (5) COBIT and ITIL, (6) IT alignment/governance maturity models 3. *Relational mechanisms*: - *Stakeholder participation and business/IT partnerships:* (1) Active participation by principle stakeholders, (2) Collaboration between principal stakeholders, (3) Partnership rewards and incentives, (4) Business/IT collocation - *Strategic dialog and shared learning*: (1) Shared understanding of business/IT objectives, (2) Active conflict resolution, (3) Cross-functional business/IT training, (4) Cross-functional business/IT job rotation

The existing literature on IT governance is very practical and normative. It focuses on frameworks, as well as maturity models developed by organizations like the ISACA (Information Systems Audit and Control Association), the IT Governance Institute, the MIT

CISR (Center for Information Systems Research), the Central Computer and Telecommunications Agency (UK) and others.

In the framework proposed by Weill and Ross (2004), before designing and implementing the governance mechanisms, the firm needs first to (1) split the IT governance system in IT areas of decision or accountability (IT principles, IT architecture, IT infrastructure, Business application needs, and IT investments), and second to (2) decide who should make decisions and be held accountable for each decision area (business executives, the CIO, business managers, etc.). They also highlight the importance of distinguishing between: (1) mechanisms for decision-making, and (2) processes for action. Both are needed in effective governance systems.

The authors also argue that IT governance should be centralized if the strategic driver and metric is cost reduction (profitability) and decentralized if the strategic driver is growth. They identified three key governance mechanisms for growth: (1) budget approval and risk management, (2) local accountability, and (3) portals or other information/services sources.

Empirical and normative studies usually define IT governance as a set of organizational structures, processes and relational mechanisms within the firm's organizational boundaries. There is an important emphasis on internal relational governance mechanisms (De Haes and Van Grembergen, 2004) as opposed to the external relational mechanisms found in the literature on IT outsourcing (presented later in this section).

Since IT governance is a highly practical topic (found in maturity models and managerial frameworks), two major IT governance maturity models (industry standards) were analyzed and compared: (1) COBIT 4.1 (Control Objectives for Information and Related Technologies), and (2) ValIT 2.0 (Value IT). The processes and control mechanisms of COBIT 4.1 and ValIT are summarized in Appendix 3. The following table compares both frameworks:

Table 1-5 Comparison of two major IT governance frameworks

Frameworks	Key characteristics
COBIT 4.1	- The framework is composed of 4 domains, 34 process and 210 control mechanisms. - Compliance, risk management and cost management are more emphasized than value creation. - COBIT describes the relationships between the governance processes, the IT objectives and the business objectives. - The framework provides matrixes that link the 34 governance processes to 28 IT goals and in turn the 28 IT goals to 17 business goals (grouped in 4 categories). - The four categories (perspectives) of business goals are: (1) financial, (2) customer, (3) internal, and (4) learning and growth.
ValIT 2.0	- ValIT is designed to complement COBIT. - The Val IT framework is a comprehensive and pragmatic organizing framework that enables the creation of business value from IT-enabled investments. - The framework adds the important dynamics of projects and portfolios that need to be accounted for in IT governance for creating value. - The framework focuses on three levels of decision-making processes: (1) Value Governance, (2) Portfolio Management, and (2) Investment Management. - Investment Management includes three major components: (1) the business case (including technical, operational and business capabilities), (2) program management and (3) benefits realization.

The COBIT model

The highly practical COBIT framework helps managers identify the key governance processes and mechanisms for the business goals they pursue. From the four perspectives of business goals identified in the framework (Financial, Customer, Internal, and Learning and growth), the Learning and Growth perspective attempts to find the link between IT governance and innovation. The other three perspectives focus on financial performance, compliance, risk-management, efficiency and customer satisfaction. While the Learning and Growth perspective includes only 2 business goals, the other 3 perspectives include 15 business goals. While the Financial perspective (cost reduction) links to 10 IT goals, the Customer perspective (quality) links to 16 IT goals, the Internal perspective (efficiency) to 18 IT goals, and the Learning and Growth perspective links to only 4 IT goals from which 3 are linked to business and product innovation: (1) creating IT agility, (2) delivering projects on time and on budget, meeting quality standards, and (3) ensuring that IT demonstrates cost-efficient service quality, continuous improvement and readiness for future change. The table below presents the governance processes and mechanisms that lead to the above three IT goals that in turn lead to product and business innovation in COBIT:

Table 1-6 Governance mechanisms that lead to IT-enabled innovation in COBIT 4.1 (cont'd)

IT goals linked to innovation	IT governance mechanisms	
Create IT agility	PO2 Define the Information Architecture 1. Enterprise Information Architecture Model 2. Enterprise Data Dictionary and Data Syntax Rules 3. Data Classification Scheme 4. Integrity Management	PO4 Define the IT Processes, Organization and Relationships 1. IT Process Framework 2. IT Strategy Committee 3. IT Steering Committee 4. Organizational Placement of the IT Function 5. IT Organizational Structure
	PO4 Define the IT Processes, Organization and Relationships 6. Establishment of Roles and Responsibilities 7. Responsibility for IT Quality Assurance 8. Responsibility for Risk, Security and Compliance 9. Data and System Ownership 10. Supervision	PO4 Define the IT Processes, Organization and Relationships 11. Segregation of Duties 12. IT Staffing 13. Key IT Personnel 14. Contracted Staff Policies and Procedures Relationships
	PO7 Manage IT Human Resources 1. Personnel Recruitment and Retention 2. Personnel Competencies 3. Staffing of Roles 4. Personnel Training 5. Dependence Upon Individuals 6. Personnel Clearance Procedures 7. Employee Job Performance Evaluation 8. Job Change and Termination	AI3 Acquire and Maintain Technology Infrastructure 1. Technological Infrastructure Acquisition Plan 2. Infrastructure Resource Protection and Availability 3. Infrastructure Maintenance 4. Feasibility Test Environment
Deliver projects on time and on budget, meeting quality standards	PO8 Manage Quality 1. Quality Management System 2. IT Standards and Quality Practices 3. Development and Acquisition Standards 4. Customer Focus 5. Continuous Improvement 6. Quality Measurement, Monitoring and Review	PO10 Manage Projects 1. Program Management Framework 2. Project Management Framework 3. Project Management Approach 4. Stakeholder Commitment 5. Project Scope Statement 6. Project Phase Initiation 7. Integrated Project Plan
	PO10 Manage Projects 8. Project Resources 9. Project Risk Management 10. Project Quality Plan 11. Project Change Control	PO10 Manage Projects 12. Project Planning of Assurance Methods 13. Project Performance Measurement, Reporting and Monitoring 14. Project Closure

Table 1-6 Governance mechanisms that lead to IT-enabled innovation in COBIT 4.1 (cont'd and end)

Ensure that IT demonstrates cost-efficient service quality, continuous improvement and readiness for future **change**	PO5 Manage the IT Investment 1. Financial Management Framework 2. Prioritization Within IT Budget 3. IT Budgeting 4. Cost Management 5. Benefit Management	DS6 Identify and Allocate Costs 1. Definition of Services 2. IT Accounting 3. Cost Modeling and Charging 4. Cost Model Maintenance
	ME1 Monitor and Evaluate IT Performance 1. Monitoring Approach 2. Definition and Collection of Monitoring Data 3. Monitoring Method 4. Performance Assessment 5. Board and Executive Reporting 6. Remedial Actions	ME4 Provide IT Governance 1. Establishment of an IT Governance Framework 2. Strategic Alignment 3. Value Delivery 4. Resource Management 5. Risk Management 6. Performance Measurement Independent Assurance

To create IT agility, the following four processes are sketched in COBIT: (1) define the information architecture, (2) define the IT process, organization and relationships (including committees, key IT personnel and system ownership), (3) manage IT human resources (including competencies, roles and training), and (4) acquire and maintain technology infrastructure.

To deliver projects on time and within budget while meeting quality standards, the following two processes are critical in COBIT: (1) manage quality (including IT standards and quality measurement systems), and (2) manage projects (including all project management practices and control mechanisms).

To ensure that IT demonstrates cost-efficient service quality, continuous improvement and readiness for future change, the following processes are highlighted: (1) manage IT investments, (2) identify and allocate costs, (3) monitor and evaluate IT performance, and (4) provide IT governance. Interestingly, in the latter (also the last process of the overall model), Strategic Alignment and Value Delivery are two of the seven key mechanisms prescribed.

The ValIT model

The ValIT model complements COBIT in that it provides more detailed guidelines for delivering value and aligning IT with business strategy (the control mechanisms seen in the last stage of the COBIT model). Instead of focusing on compliance and cost management, ValIT focuses on the effectiveness of IT (doing the right things) and the links between IT governance and enterprise governance. ValIT was inspired by the approaches seen earlier by Nolan and McFarlan, (2005) and Weill and Ross (2004). While the framework provides ways to measure value from IT portfolios and investments and accounts for project management capabilities (IT Governance Institute, 2008; UcedaVelez, 2009), it focuses on cost management and efficiency as opposed to innovation.

Nevertheless, the real value in ValIT is in the way it accounts for project and portfolio dynamics (as opposed to COBIT) and the complex web of decision-making relationships that connect the following three managerial levels: (1) Value Governance, (2) Portfolio Management, and (3) Investment Management. While Investment Management addresses issues in individual programs or projects, Portfolio Management looks at the overall picture of IT initiatives. Value Governance on the other hand establishes the overall governance framework.

In general, the IT governance literature ignores the role of the external IT networks (including vendors and consultants) in creating and enabling the IT governance system. Also the links to project management practices are generally weak and the normative project management performance criteria (cost, quality, delay) are emphasized.

1.2.3 IT outsourcing relationships and the external perspective

Empirical studies have not found a positive relationship between IT outsourcing and performance (Stewart et al., 2002). There are two major premises in literature: (1) that only non-strategic IT activities are to be outsourced, and (2) that the benefits of outsourcing are mainly economical from a transaction cost perspective.

Nevertheless, many authors have attempted recently to find a positive relationship between inter-organizational relationships and competitive advantage (Dyer, 1996; Dyer and Singh, 1998; Stewart et al., 2002; Wang and Wei, 2007; Weeks and Feeny, 2008; Goo et al., 2009). The research conducted by some of these authors (Dyer and Singh, 1998) led to the Relational View (RV) concept; an extension to the RBV approach (seen earlier in this chapter).

Only very few authors like Weeks and Feeny (2008) examined the relationship between IT outsourcing and innovation. Most studies focus more on the way inter-organizational relationships and governance can lead to cost reduction and efficiency as opposed to innovation. Both efficiency and innovation lead to competitive advantage but in two different ways.

While Stewart et al. (2002) used the RBV approach to understand the positive impact of both the strategic control of IT resources and the selective outsourcing of IT on performance, Dyer and Singh (1998) extended the RBV approach to explore how partnerships and relational governance lead to knowledge sharing activities and complementary organizational capabilities that in turn lead to a relational rent and competitive advantage. Their relational view of strategy provides very relevant descriptions of the concept of relational governance. Weeks and Feeny (2008) on the other hand looked at the key enablers of innovation in the client-supplier outsourcing relationship.

Relational governance involves the expectations of relationship continuity and mutuality, which can regulate opportunism by casting a visible future and moral controls (Josi and Cambell, 2003; Wang and Wei, 2007). The concept is based on a social component, largely represented by trust and commitment (Goo et al., 2009).

A more recent research in the literature was conducted on the relationship between the contracts (the service level agreements (SLAs)), relational governance and value creation (or competitive advantage) in IT outsourcing activities (Goo et al., 2009; Gopal and Koka, 2012). Gopal and Koka, (2012) found that the effects of relational governance in IT outsourcing differed

depending on the type of outsourcing contracts used and Goo et al. (2009) advance that SLAs can have significant positive influence on the various aspects of relational governance in IT outsourcing relationships.

The studies in the table below that found a connection between inter-organizational activities and competitive advantage are based upon two important theories: (1) the RBV approach, and (2) transaction-cost economics (TCE).

The following table summarizes the key aspects of the literature that focuses on IT outsourcing and relational governance for cost reduction and efficiency (as opposed to innovation):

Table 1-7 Relevance and limitations of inter-organizational approaches (cont'd)

Authors	**Gopal & Koka, 2012; Wang & Wei, 2007; Stewart et al., 2002; Dyer & Singh, 1998; Dyer, 1996**
Objectives	- Understand how the strategic resource-based and selective decision-making process for IT outsourcing has a positive effect on business performance and competitive advantage. - Understand how relational rents and in competitive advantage are enabled by strategic complementarity and relational governance in ongoing supply-chain relationships. - Understand the link between relational governance (relational flexibility) and the type and nature of contracts (and service level agreements) in IT outsourcing relationships.
Key Findings	- Firms who see and manage IT as a strategic resource will be less likely to outsource. In turn their control over these strategic IT resources increases and this has a positive effect on performance (Stewart et al, 2002). - Relational governance and integration lead to information visibility in supply chains, which lead to the competitive advantage of the supply chain (Wang & Wei, 2007). - Relational governance leads to complementary capabilities in the supply chain that leads to important economies in transaction costs and value creation (Dyer & Singh, 1998; Dyer, 1996). - Formal contracts have positive influence on relational governance (Goo et al., 2009) - Relational flexibility (governance) positively affects profitability only in fixed price contracts and positively affects quality in time and materials contracts (Gopal & Koka, 2012).

Table 1-7 Relevance and limitations of inter-organizational approaches (cont'd and end)

Limitations	- The authors consider outsourced IT activities as non-strategic (Stewart et al., 2002). - Only stable and ongoing outsourcing relationships in supply-chain processes are researched as opposed to more complex and innovative IT initiatives and projects. - Internal relationships linking the IT decision-making to business managers and corporate strategy were not investigated (these connections are more important in strategic project settings). - The authors (Wang & Wei, 2007; Dyer & Singh, 1998) do not look at relational governance in project settings and do not look at the impact of relational governance on innovation. Additionally, their definition of value creation can be vague. - Even though the authors argue that supply chain management combined with relational governance goes beyond reducing costs to creating value through flexibility in supply chains, they do not explain how relational governance can lead to innovation through IT initiatives. - Authors who found a positive relationship between outsourcing and competitive advantage draw upon the concept of Transaction Cost Economics (Williamson, 1985). - Authors who applied relational governance to IT outsourcing activities only investigated the effect of relational governance on profitability and quality from a supplier's perspective as opposed to innovation from the buyer's perspective (Gopal & Koka, 2012).
Relevance for this research	- The authors strongly believe in the strategic importance of IT activities. - The findings are relevant for the current research in that they show important gaps in the way inter-organizational governance can be used in IT project setting to enable innovation. - They believe that performance and competitiveness can be considerably enhanced if IT resources are treated as rare and core strategic resources. - The same RBV principles that emphasize inter-organizational capabilities (the relational view) leading to flexibility and competitive advantage in supply chain relationships are adopted in the current research and applied to settings in IT initiatives.

The authors in the above table can be split in two groups: (1) authors who study IT outsourcing relationships and their links with relational governance, strategy and competitive advantage (Stewart et al., 2002; Gopal and Koka, 2012), and (2) authors who study relationships in supply chains and their links with relational governance and IT systems (Dyer and Singh, 1998; Wang and Wei, 2007). Relational governance plays a key role in the creation of relational rents because it influences transaction costs, as well as the willingness of alliance partners to engage in value-creating initiatives (Dyer and Singh, 1998). However, the authors here focus more on the transaction cost (cost management) aspect of relational governance than on its value-creation and innovation aspect. Their work focuses more on how governance affects efficiency and cost reduction than innovation. For instance, Dyer and Singh (1998) advance that self-enforcing safeguards result in (1) lower contracting costs, (2) lower monitoring costs, (3) lower adaptation

costs, (4) lower recontracting costs, and (5) superior incentives for value-creation activities. Value creation is not emphasized and its definition is not clear.

IT outsourcing and relational governance are important concepts for his research. Even though few authors combined the two concepts in one study (Goo et al., 2009; Gopal and Koka, 2012), their findings are relevant for the current research in that they show important gaps in the way inter-organizational governance can be used in IT project settings to stimulate and enable innovation. Even though these studies highlight the importance of formal contracts and SLAs in relational governance and in turn in value creation, they focused on the effect of relational governance on profitability and quality from a supplier's perspective (Gopal and Koka, 2012). Also, Goo et al. (2009) who studied the important enablers for change and innovation in SLAs only looked at innovation from a process improvement perspective (as opposed to product innovation and strategic renewal from the buyer's perspective).

The following table presents the key aspects of studies attempting to show the relationship between IT outsourcing and innovation for the buyer (the only one found):

Table 1-8 Relevance and limitations of IT outsourcing approaches (cont'd)

Authors	**Goo et al., 2009; Weeks and Feeny, 2008**
Objectives	- Show that outsourcing is not incompatible with innovation. - Understand how firms enable collaborative relationships that trigger innovative initiatives that in turn have a positive impact on business innovation (Weeks and Feeny, 2008). - Show how formal contracts and relational governance (that enables change, flexibility and adaptation) are complementary.
Key Findings	- Weeks and Feeny (2008) found a new set of key enablers of innovation in outsourcing separated in three categories: (1) client enablers, (2) supplier enablers and (3) relationship enablers. The supplier and relationship enablers are key because they emphasize the importance of an open innovation system. - Measurement specificity can reinforce trust and commitment. - SLAs can include important change characteristics and mechanisms that facilitate joint adaptation, conflict resolution and in turn innovation (Goo et al., 2009).

Table 1-8 Relevance and limitations of IT outsourcing approaches (cont'd and end)

Limitations	- The authors only investigated IT initiatives in ongoing outsourcing relationships. - The revered scenario was not considered: when innovative and ambitious IT projects create new relationships with new IT suppliers and consultants with refreshing ideas. - The model developed by Goo et al. (2009) looked for the positive effect of formal SLAs on relational governance but did not go further into understanding the relationship with the buyer's innovation capability or with the extent of innovation in the systems (systems breakthroughs) - In general intra-organizational processes and mechanisms are not emphasized in these studies because the focus is on the relationship between the IT organization and the IT vendor and the relationships between the IT organization and the rest of the business is ignored.
Relevance for this research	- Many of the enablers in ongoing outsourcing relationships can be used in describing the supplier selection process and the co-innovation relationships with the network of external partners in ambitious IT projects. - Trust and commitment a key requirement of the IT/Supplier relationship for innovation. - The view of formal contracts as enablers of co-innovation and value creation is critical and should be adapted to IT project settings. - The importance of the learning curve in reaching effective co-innovation relationships. - The study highlights the higher chances of succeeding in innovative IT initiatives conducted with IT partners that share a history of positive relationships with the client.

A common concept advanced by authors is the importance of building the relational governance and the incentive system that can induce the suppliers to make bigger commitments leading to substantial efficiencies and improvements. This process was also linked to innovation where formal contracts are structured and designed in ways to foresee future change and innovation (Weeks and Feeny, 2008; Goo et al., 2009). In their model, Goo et al. (2009) advance that the three characteristics of contracts (foundation, change and governance) contribute fairly to the development of relational norms, harmonious conflict resolution and mutual dependence. In the contract change components they identified four plans (with clauses and practices) from which one aims at managing the innovation process. However, they define innovation from a business process perspective as opposed to a product innovation and strategic renewal perspective.

Goo et al. (2009) focused on contractual arrangements on one hand, and Weeks and Feeny (2008) looked at three types of enablers on the other: (1) client enablers, (2) supplier enablers and (3) relationship enablers. The Weeks and Feeny approach is highly relevant for the current research because of the way it combines client-specific enablers to the relationship enablers

(focused on contracts and relational governance). A table summarizing and comparing the three types of enablers in Weeks and Feeny (2008) is presented in the appendix.

While some authors concluded that only non-strategic IT activities had to be outsourced (Stewart et al, 2002), some advanced that IT outsourcing relationships could lead to value creation or innovation (Weeks and Feeny, 2008; Goo et al., 2009), and others found that relational rents and competitive advantage could be achieved through long-term supply chain relationships (Dyer and Singh, 1998).

Moreover, Dyer and Singh (1998) argue that effective governance affects the willingness of partners to engage in value creating initiatives, but the authors do not explain the relation with innovation from the client's perspective and they do not show how such initiatives can be managed once they have been identified or launched by the partners. Furthermore, the few authors who studied the relationship between IT outsourcing and innovation only define innovation as improvements to the business process as opposed to product and market innovation (including IT system breakthroughs).

1.3 Project management alternatives and project governance

The purpose of this section is to explore the concept of project governance, an alternative approach to traditional project management approaches, that can be used to address more innovative projects in more uncertain and dynamic environments. Also, a quick review of the approaches used in the study of strategic IT projects will be presented with an aim to find studies where the concept of project governance is applied to IT. The current section is thus organized in the following way:

1. Rethinking project management
2. The project governance alternative
3. Approaches used in IT projects

1.3.1 Rethinking project management

The field of project management, defined today by large project management institutions and associations like the PMI (Project Management Institute), has its roots in civil and systems engineering.

The normative project management techniques prescribed in PMI's PMBOK and the UK government's PRINCE (Projects in Controlled Environments) standard have evolved from the scientific techniques developed for the post-war military undertakings like PERT (Program Evaluation Review Technique) and CPM (Critical Path Method). Both the PERT and CPM methods that Morris (1997) calls the progenitors of project management were purely normative[8]. The intellectual activity for developing the field was based largely on quantitative techniques within operational research (Hodgson and Cicmil, 2006).

[8] Booz Allen Hamilton developed the PERT management control method for the Polaris submarine-missile project and DuPont developed the CPM approach for managing military construction projects.

The major impetus for the current awakening in project management and the search for alternative approaches to mainstream project management normative methods (e.g. the PMBOK and PRINCE) is the dramatic and extensive record of failures, losses, cost overruns, and schedule delays in recent large projects (Staw, 1997; Flyvbjerg, 2003; Williams, 2005). Overruns are being typically between 40% and 200% (Williams, 2005), and the study by Flyvbjerg et al. (2003) on major transportation infrastructure projects shows an average of 90% overruns.

Little radical examination of the intellectual foundation of project management has been done (Morris, 1997; Cicmil et al, 2006; Hodgson and Cicmil, 2006) and the dominant discourse in project management is based on a very narrow implicit theory (Williams, 2005). The mainstream view is a functionalist and instrumental view where the function of a project is to accomplish a finite piece of work, in a specified period of time, within a certain budget and to agreed specs (Hodgson and Cicmil, 2006). The major intellectual contributions in the recent wave of project rethinking include Morris (1997), Miller and Lessard (2001), Williams (2005), Cicmil and Hodgson (2006)[9], and Germain (2006) as well as other contributions such as those in organizational decision-making by March (1997) and Staw (1997).

The following table summarizes the conclusions and suggestions for future research advanced by the authors who clearly call for alternative approaches to normative project management techniques that are needed to understand more complex, innovative and uncertain projects:

Table 1-9 Future research suggestions by project management authors (cont'd)

Authors	Conclusions and suggestions for future research
Bresnen (2006)	- Bresnen identified the following best practices in successful transformational IT projects: 1. Change is characterized by feedback loops and iterations between planning and implementation not by clear progression from planning to implementation. 2. Social networks are characterized by a continuity of staffing and relationships not by discontinuities in relationships. 3. Shaping of practice is conducted via internal policy and authority instead of external contracting. 4. Change (the project) is made to improve organizational long-term performance instead of simply to improve short-term project performance.

[9] The Scandinavian school described by Cicmil and Hodgson (2006) expresses three major deficiencies ingrained, maintained and reproduced in project management research: (1) the assumed universality of project management theory, (2) the lack of empirical studies of projects, and (3) the lack of alternative representations of projects.

Table 1-9 Future research suggestions by project management authors (cont'd and end)

Sydow (2006)	- The management of projects needs a theory that is able to conceptualize the relationship of the fluid and the permanent, to care for process as much as for context, to take into account action as well as structure, and to conceptualize the interplay of more micro and more macro levels of analysis with the project level. - The author suggests extending the contextual focus pursued to the societal level, returning to organizational contexts that matter in inter-organizational projects and paying more attention to the interplay between (1) powerful acting, communicating and sanctioning, on the one hand, and (2) the structures of domination with structures of signification and legitimation from which these interactions are derived, on the other.
Cicmil and Hodgson (2006)	- Researchers should undertake critical research work on project management with a broad even eclectic base, drawing upon social theories, philosophies, and ethical/moral positions like environmentalism, labor-process theory or post-structuralism. - The authors recommend that intellectual efforts be focused on encouraging inspiration from a variety of theories and ideas, as a counterforce to technicist and instrumental forms of rationality in project environments.
Clegg et al. (2006)	- The authors believe that researchers should spend less time looking at strategic planning and more time researching everyday organizational life because it is rather more in the detail that action unfolds and outcomes are produced.
Cicmil (2006)	- The author suggests using a combination of two qualitative research approaches, interpretative and critical, as an alternative way of understanding and talking about project management practice. - The methodological approach of Pragmatic Epistemology suggested by Calori enables researchers and practitioners to address together issues such as social responsibility, intuition, judgment, emotions, the operation of dominant discourses, power-knowledge relationship, and practical wisdom, which are rarely captured by conventional research methodologies in project management.
Williams (2005)	- The author argues that project analysts should try to define and quantify the project metrics (structure complexity, uncertainty and pace) and to find the best mix of project management approaches (planning once versus constant re-planning) depending on the quantified metrics.
Flyvbjerg et al. (2003)	- The author suggests looking at the social construction of projects by focusing for instance on who is included in and who is excluded from, the decision-making process.
Staw (1997)	- Labs should be avoided and instead qualitative research should be adopted to understand complex projects and especially the persistence, withdrawal and escalation forces in projects. - The author attests to the difficulty but usefulness of having to deal with grounded qualitative data.

The changes authors call for can be brought down to four themes: (1) beyond the division of labor and control, (2) a wider definition of project management, (3) reconnecting front-end strategy and design to implementation, and (4) expanding the one-off view of projects.

Beyond the division of labour and control

Normative project management techniques are deeply rooted in Taylor's division-of-labor philosophy where the decision maker, the architect and the executer are separated (Geslin, 2006). Most project management textbooks also rely on Fayol's 1916 Elements of Management when defining the specific responsibilities of the Project Manager – planning, organizing, commanding, coordinating and controlling (Hodgson, 2004; Williams, 2005). More value creating responsibilities such as leading, combining, creating, building, and problem solving are ignored. Although project management tools emphasize bureaucratic control mechanisms, Hodgson (2004) describes project control mechanisms used by practitioners as hybrid forms of bureaucratic and post-bureaucratic values and he focuses on the importance of maintaining a constant tension between these two opposing forces.

A wider definition of project performance

The dominant discourse in project management is built around three performance criteria: (1) cost, (2) time and (3) quality. These three indicators are weak in determining the performance of complex and innovative projects where activities are dynamically connected to internal organizational activities (capabilities and processes) and external social, cultural, political and environmental activities. Recently, authors have introduced performance measures spanning psychology, sociology, governance, decision-making, politics, etc. For instance, large engineering project performance measures were expanded to include discussions about the role of institutions, risks, and governance (Miller and Lessard, 2001; Flyvbjerg et al., 2003; Cicmil and Hodgson, 2006). Project cost escalations, that lead to large irreversible losses, are very often due to psychological, social and organizational factors that go beyond the project (Staw, 1997).

Governed by the tradition of science and engineering, the project management body of knowledge emphasizes the role of project actors and managers as implementers narrowing their role to the issues of control and content (planned scope of work), marginalizing their wider potential role as competent social and political actors in complex project-labeled arrangements (Cicmil and Hodgson, 2006).

Reconnecting front-end strategy and design to implementation

The problem with the engineering approach is that the specifiers and the implementers are separated and the specifiers are easily led into developing unrealistic and overambitious expectations (Morris, 1997). Additionally, the traditional strategic planning approach limits creativity during the delivery stage because the solution is locked-in early (Clegg et al., 2006). The reconnection between front-end strategy and implementation is critical in IT initiatives where the nature of software and business processes (as opposed to physical constructs) allows for more flexibility.

This clear-cut separation is driven by stiff decisions and irreversible commitments that crystallize the result of subsequent activities (Geslin, 2006). The disconnection between strategy and implementation can also lead to conflicts, misunderstandings and failures. In large engineering projects for instance, environmentalism forced sponsors to include social actors in the front-end stage of projects to avoid uncontrollable costs, painful negotiations and cancellations (Morris, 1997). In successful projects, a long shaping process characterizes the front-end stage and helps resolve conflicts before gaining approval (Miller and Lessard, 2001).

Expanding the one-off view of projects

The projectification trend in the 1960s was dominated by the idea that "temporary" organizational forms would liberate people from their bureaucratic iron cages; the project work form can be seen as providing freedom, a sense of doing something important and stimulating (Lindgren and Packendorff, 2006). This view of projects as one-off temporary structures is problematic and can lead to failures on the long run. Also, projects are generally decoupled from the environment (external and internal) and seen as "islands of order" (Williams, 2005). Project management clearly needs a more systemic and sustainable view of projects[10].

[10] Linde and Linderoth (2006) for example suggest applying the Actor Network Theory (ANT) in the analysis of project processes as a solution for expanding project management theory.

1.3.2 The project governance alternative

As previously seen, governance can be used (Miller and Lessard, 2001; Cicmil and Hodgson, 2006) as an alternative way to study and manage strategic projects allowing for flexibility and innovation. Nevertheless, project governance is a new research area that is emerging in the public sector (Crawford and Helm, 2009) and that generally remains an elusive concept (Kelly, 2010) for which there is no clear definition. Only a handful of articles relating to project governance have been published recently and none in the field of information technology (Williams et al., 2008). The following table provides different definitions of project governance found in the literature:

Table 1-10 Major project governance definitions (cont'd)

Authors	Definitions
Müller (2009)	- Project governance coexists within the corporate governance framework as it applies to portfolios, programs, projects and project management. - It comprises the value system, responsibilities, process, and policies that allow projects to achieve organizational objectives.
Weaver (2007)	- Project governance is a sub-set of corporate governance, focusing on the areas of corporate governance related to project activities, including: (1) portfolio direction, (2) project sponsorship, (3) project and program management and efficiency, and (4) disclosure and reporting.
Turner (2006)	- Within the project-based organization there are three levels of governance: (1) the board level, (2) the context within which the projects take place, and (3) the level of the individual project: 1. The first level identifies corporate governance. 2. The second level identifies project governance and aims at ensuring the organizational infrastructure to undertake projects effectively through two components: (1) an infrastructure of program and portfolio management (ensuring the right projects are done), and (2) the capability to deliver projects (ensuring projects are done right) 3. The level of the individual project (since the project is a temporary organization)
Association of Project Management (APM) (2004)	- Project governance concerns those areas of corporate governance that are specifically related to project activities. - The effective governance of project management ensures that an organization's project portfolio is aligned to the organization's objectives, is delivered efficiently, and is sustainable. - Governance of project management also supports the means by which the board and other major project stakeholders are provided with timely, relevant, and reliable information.

Table 1-10 Major project governance definitions (cont'd and end)

Miller and Lessard (2001)	- Neither gambling nor pure rationality are applicable in the messy front-end stage of large engineering projects for the following reasons: (1) it is impossible to predict the future of the project over 10-15 years of shaping and ramping-up, (2) decision-making is about facing reality as issues arise, and (3) sponsors do not sit idle waiting for the probabilities to yield a win or a loss but work hard to influence the outcomes. - The ability to create options depends not only on the ability of envisioning possible circumstances under which alternative approaches might be desirable but also on creating the relationships among sponsors, specialists, financiers and stakeholders that will allow choices to be made at future points free from opportunistic behavior by specific parties. - Projects are shaped by including a variety of factors and stakeholders early in the process.

In contrast to the concept of relational governance explored in the IT outsourcing literature and found in studies of supply chain relationships, project governance can take into account the idiosyncratic nature of project settings in creating value and enabling innovation.

While Turner (2006) emphasizes the importance of combining project governance with corporate governance on one side and to the delivery capability of individual projects on the other, the model does not include the critical inter-organizational governance processes and mechanisms needed in strategic IT initiatives. The model is highly focused on the inside of the firm and does not reflect the realities in IT initiatives captured in the current research.

In general, project governance literature focuses on (1) how the right projects are selected through strong links with corporate governance (Turner, 2006; Müller, 2009), (2) how project failures are avoided (Association of Project Management, 2004) and (3) how projects are delivered efficiently (Weaver, 2007; Turner, 2006). In contrast, Miller and Lessard (2001) provide an interesting perspective that differs from the mainstream project governance literature because of its focus on highly complex and collaborative engineering projects where the lifecycle of project organizations is longer and where inter-organizational mechanisms and sponsor-supplier relationships are more dynamic and critical than intra-organizational relationships connecting the project to corporate strategy.

Instead of using scenario planning or real options theory (Myers, 1977; Fichman et al., 2005) to study large engineering projects, Miller and Lessard (2001) opted for a governance model where high-level mechanisms structure relationships, allow managers to react to unforeseen events, and provide the flexibility needed for innovation.

1.3.3 Approaches used in studying IT projects

Recent failures and difficulties in large IT projects (Williams, 2005) and the many reports by consulting firms (the Standish Group report, etc.), led academics and practitioners to research alternatives to the normative project management approaches. However, none of the proposed alternatives uses the governance approach (Williams et al., 2008). Although corporate governance and IT governance have formal frameworks, there is a lack of guidance regarding project governance and by implication, IT project governance (Marnewick and Labuschagne, 2011).

The research addressing alternative approaches to managing strategic and innovative IT projects was organized in three themes: (1) studies of success factors in ERP projects, (2) the agile approach in IT projects, and (3) the real options approach. These alternatives exclude the governance approach that is yet to be explored in the context of IT projects.

The success factors of ERP projects

Thomas H. Davenport studied initiatives of enterprise systems (Davenport, 2004) and presented five key strategies for successful implementations: (1) clarify business strategy before planning the enterprise system, (2) change organizational structures to address information-flow problem, (3) create competitive advantage with your enterprise system, (4) put the right people in place, and (5) install your enterprise system gradually.

Most studies found on the implementation of IT projects were conducted on enterprise systems and more specifically on ERP (Enterprise Resource Planning) systems. More recent studies included CRM (Customer Relationship Management) systems.

Mature enterprise systems like the ERPs developed by SAP or Oracle originated in manufacturing. The early versions of the ERP are the BOM (Bill Of Materials) and the MRP (Manufacturing Resource Planning), both used for managing manufacturing operations. ERP today comprises of a commercial software package that promises the seamless integration of all the information flowing through the company's financial, accounting, human resources, supply-chain, and customer information (Davenport, 1998).

Many studies of success factors in IT projects exist and can be split in the following way: (1) studies focusing on IT specific factors (Delone and McLean, 1992), (2) studies focusing on environmental or contextual factors (Ives et al., 1980), (3) studies combining both IT specific and contextual factors (Zhang et al., 2005), and finally (4) studies highlighting the interactions between the IT systems and the social networks (Xue et al., 2005). The success factors highlighted by these studies include the following major factors: (1) top management support, (2) business process reengineering (BPR), (3) project management, (4) clear goals and vision, (5) training and education, (6) teamwork, and (7) change management.

The success factors mentioned above are either (1) buyer focused (top management support, BPR, training, change management, etc.), (2) project focused (project management, project champion), or (3) IT / technologically focused (hardware-software fit, system quality, etc.). Most of the factors are internal and touch upon the business and strategic alignment of IT; top management support, user participation, user characteristics, company IT expertise, cultural fit, system and business fit and visibility of implementation are all factors that positively impact business alignment and in turn the success of the enterprise system or ERP implementation. Finally, factors that focus on flexibility, change and innovation, the management of external networks (IT suppliers, consultants and vendors), and decision-making processes and relationships are largely ignored.

The agile project management approach in IT

More recently, software development managers and researchers (Highsmith, 2004; Holmström et al., 2006; Sheffield and Lemétayer, 2012) looked for alternative and more effective ways for planning and coordinating innovative software development projects. The agile project management methods are softer, narrower and more practical versions of the evolutionary approaches for managing complex systems projects (Hobday, 1998; Bar-Yam, 2002). Change planning, experimentation, simulation, adaptation and innovation are core principles in agile project management. The authors propose enablers for agile project management that include: (1) focusing on working products not on processes, (2) strong collaboration with customers instead of contract negotiation, and (3) responding to change over following a plan.

Although agile project management methods can be practical and effective for middle management in IT functions, they are too narrow to work in highly strategic contexts where corporate governance and various organizations are involved and where strategic alignment processes are needed.

The real options approach and innovative IT projects

The real options approach (that originated in economics and finance) is another project management alternative that was applied to IT projects by a few authors like Fichman et al. (2005). The approach was first developed by Stewart Myers at MIT (Myers, 1977) and applied to oil and mining companies. The following are the key elements in options thinking: (1) a qualitative, intuitive but structured approach, (2) the value of an option increases the longer the option can be held, (3) real options increase the chances of doing the right project, and (4) learning by doing and learning while waiting.

Real options can be embedded in IT projects to improve the selection process of IT suppliers and more importantly to improve the development and delivery processes of IT modules. Embedded options enable the selection of the right IT modules at the right time and enhance the potential

business benefits of such modules. Managers organize project reviews where real options are embedded in project structures and this is done consciously or unconsciously.

A major concept addressed by Fichman et al. (2005) is the importance of systematically introducing "growth" and "switch" options. The value of these embedded options can determine the potential of an IT project's impact on innovation. Real options and modularity are very similar concepts in that the decomposition of IT projects into smaller modules is key for project success and evolutionary innovation.

Although the real options approach ignores the key relational mechanisms needed in strategic projects (internal and external), it is still relevant and can be used as an integral part of a more encompassing governance approach. The approach also shows how modularity and switch-use capabilities can be used for flexibility and in turn to address change and uncertainty.

1.4 Conclusions on the relevant literature and its contribution

In the current theory-building approach, the literature review is not a prerequisite to the research process (data collection and analysis), but is instead conducted in parallel and used to narrow down the research focus through a number of iterations. The review illustrates that the lack of theoretical progress in IS or IT research (Webster and Watson, 2002) still exists today and especially in linking the concepts of governance and innovation. The review process was concept-centric and aimed at systematically completing a census of relevant literature while identifying critical knowledge gaps (Webster and Watson, 2002).

The literature review in this research was used to accomplish the following tasks:

1. Explore the conceptual relationship that exists in the literature between governance and innovation from an IT perspective.
2. Understand the degree to which each relevant theoretical field answers the research questions, namely the way governance leads to innovation in strategic IT initiatives.

The current section will present a summary of the relevance of each one of the reviewed fields and the extent to which they cover the core concepts of the research question (the three axes of governance and the two types of innovation). The summary is introduced and structured in the following table:

Table 1-11 Overview of links between the relevant fields and the core research concepts

Fields	**Governance**			**Innovation**	
	Project	Intra-org.	Inter-org.	Exploratory (growth)	Exploitative (efficiency)
IT-enabled innovation	Weak	Strong	Average	Average	Strong
IT alignment and governance	Weak	Strong	Weak	Weak	Strong
IT outsourcing and the relational view	Weak	Weak	Strong	Weak	Strong
Project governance	Strong	Average	Average	Average	Strong

The above table shows that the three governance axes that emerged from the research (in the first intermediary model) are not addressed simultaneously in any of the fields reviewed. The fields of IT-enabled innovation and IT alignment and governance emphasize intra-organizational governance and in turn exploitative innovation (process innovation) and efficiency. The only field that covers the three axes of governance to some extent is project governance. Nevertheless, project governance has barely been researched in the context of IT.

The innovation typology used in this research was mainly drawn from the literature (even though partly driven from the field exploration) and includes two major types of innovation: (1) exploratory innovation that includes market innovations and more radical product innovations, and (2) exploitative innovation driven by process innovation and that leads to efficiency. Although this typology is not applied per se in the context of IT projects, it has already been proposed by a few authors in the literature on IT-enabled innovation. Furthermore, the exploitative and efficiency-oriented aspect of this typology is emphasized in the literature as

opposed to its exploratory and growth-oriented aspect. Given the dynamic and exploratory nature of project settings, the current study can be very beneficial in expanding the exploratory (growth-oriented) dimension of the typology in the context of IT (currently under-rated).

Another important innovation typology found in the literature that influenced the current research is the closed-open typology that is reflected in the governance category of the research model (the independent variable) where closed intra-organizational mechanisms are compared to open inter-organizational mechanisms. The openness of innovation is thus reflected by the importance of inter-organizational factors (governance) in the IT initiative leading to exploitative (process) or exploratory innovation (product and market). Moreover, organizational innovation, the fourth type of innovation in Schumpeter's typology (Schumpeter, 1934; OECD, 2005a), is also reflected in the governance category where governance mechanisms are defined as high-level organizational determinants used in strategic situations with high levels of uncertainty leading to more radical innovations.

1.4.1 The conceptual link between governance and innovation

The current research is conducted on the premise of an emerging theoretical link between the concepts of governance and innovation that is found in a growing number of studies in the literature. The concept of governance is used in literature to link strategy (and innovation) to both (1) IT management, and (2) project management. Consequently, the concept appears to provide a highly appropriate way to study strategic IT initiatives and their effect on innovation. Governance appears to have the capacity and to provide the level of analysis that is suitable in more uncertain and exploratory environments leading to more radical innovations. The concept also appears to be very beneficial in studies that expand the traditional view of IT-enabled value creation (largely focused on exploitative process innovation and efficiency) by including the IT activities that lead to more exploratory and radical product and market innovations.

Even though the link between governance and value creation through process innovations and exploitation is a core component of IT alignment and IT governance research, these fields lack

the exploratory side of value creation that leads to more radical product and market innovations and to business growth (as opposed to business efficiency).

The concept of governance is used to create value in the literature in five different ways: (1) to leverage IT activities for innovation (Gordon and Tarafdar, 2010; Weeks and Feeny, 2008), (2) to align IT and corporate governance (Henderson and Venkatraman, 1999; Weill and Ross, 2004; De Haes and Van Grembergen, 2004), (3) to build a competitive advantage through inter-organizational relationships in IT outsourcing and supply chain processes (Dyer and Singh, 1998; Goo et al., 2009), (4) to connect project management to corporate governance (Turner, 2006), and (5) to manage large projects of complex systems (Miller and Lessard, 2001). These five governance perspectives can be brought down to the three governance axes used in the research model: (1) intra-organizational, (2) inter-organizational, and (3) project. Research found in each one of the three axes is compared in the following table:

Table 1-12 Comparing the three major governance perspectives in the literature (cont'd)

	Intra-organizational (IT) Governance	**Inter-organizational (relational) governance**	**Project governance**
Main Authors	Nolan and McFarlan (2005) Weill and Ross (2004) De Haes and Van Grembergen (2004)	Goo et al. (2009) Weeks and Feeny (2008) Wang and Wei, 2007 Dyer and Singh (1998)	Turner (2006) Miller and Lessard (2001) Flyvbjerg et al. (2003)
Definitions	- IT governance is the process by which firms align IT actions with their business goals and strategies and assign accountability for those actions and their outcomes. - IT Governance consists of the (1) leadership, (2) organizational structures and (3) processes that ensure that the IT sustains and extends the organization's strategies and objectives.	- Relational governance involves the expectations of relationship continuity and mutuality, which can regulate opportunism by casting a visible future and moral controls. - The concept is based on two components: (1) a social component, and (2) a transaction-cost component.	- In the first approach (Turner, 2006), governance is the connection between project management and corporate governance in the business. - In the second approach (Miller and Lessard, 2001), governance represents the specificity of the relationships between a set of independent players determined by various coordination mechanisms.

Table 1-12 Comparing the three major governance perspectives in the literature (cont'd and end)

Governance mechanisms	- In the COBIT 4.1 framework 34 processes and 210 control mechanisms are part of the maturity model. - Weill & Ross (2004) identified 3 types of IT governance mechanisms: (1) decision-making structures (committees), (2) alignment processes, and (3) formal communications (announcements, formal committees, etc.).	- The governance concept includes integration processes, contracts or SLAs, relational flexibility, trust, client roles, supplier roles, risk sharing, etc. - Dyer and Singh (1998) distinguish between the formal and informal self-enforcement mechanisms. They also distinguish between third-party enforcement and self-enforcement mechanisms.	- In the first school, mechanisms are intra-organizational and related to portfolio management and business-IT communication and processes. - In the second school, three major levels of inter-organizational mechanisms were identified: (1) narrow (interpersonal relations and mutual trust), (2) midrange, and (3) broad (a systemic ensemble of projects)
Limits	- IT governance ignores the need to constantly include and synchronize large networks of IT partners in a collaborative way. Intra-organizational coordination for strategic alignment is overemphasized.	- The relational school is dominated by the transaction-cost approach (Williamson, 1985) and focuses on cost control and efficiency as opposed to innovation and collaboration. The concept of value creation and the incentives that lead to initiatives are not explored and not linked to innovation.	- In the first approach, projects are regarded from an intra-organizational perspective. - In the second approach, the external inter-organizational mechanisms and the ability of firms to collaborate are overemphasized and intra-organizational relationships are ignored.
Relevance for the current research	- IT governance literature emphasizes mechanisms and devices that structure the intra-organizational relationship between the CIO / IT managers, business managers and senior executives. These internal mechanisms complement the external and relational mechanisms found in relational governance and project governance.	- Relational governance is highly relevant from an inter-organizational perspective. - Mechanisms such as partner scarcity, contracts and SLAs, history of interactions and personal ties (socially complex and hard to imitate) are relevant for the current research. - The effect on the willingness of partners to engage in value creation activities is critical.	- The first approach has a lot in common with IT governance frameworks that look for internal alignment between IT and strategy. - The second approach is more relevant in that it looks for creative ways to address complexity in large projects and to allow for higher levels of change and innovation.

The above table shows how the literature associates governance to value creation through exploitation, cost control, and efficiency as opposed to exploration and innovation. Nevertheless, attempts to use the governance approach to address higher levels of uncertainty and to manage more exploratory and radical innovation processes were found in two fields: (1) IT-enabled innovation, and (2) the governance of large engineering projects.

First, the recent IT-enabled innovation literature introduces the concept of governance as a way to enable innovation through more effective connections with the decision-makers in the business. For instance, Gordon and Tarafdar (2010) stressed the importance of establishing a governance system of control for IT-enabled innovation but have mainly focused their model on the notions of centralization and decentralization of IT applications. Also, Marwaha and Willmott (2006) suggested an IT governance model for enabling innovation using three separate governance groups with three separate objectives: (1) exploiting IT capabilities for economies of scale, (2) creating new IT capabilities for competitive advantage, and (3) transferring the IT capabilities form one business unit to another enabling business innovation. Both studies linked governance to innovation by focusing on intra-organizational relationships and largely ignored inter-organizational and project-based relationships and dynamics.

Second, the literature that studies the governance of large engineering projects (and public projects) focuses on the strategic inter-organizational relationships and mechanisms in highly complex and uncertain environments that lead to flexibility and innovation. The link between governance and innovation in these studies emphasizes the inter-organizational and project-based mechanisms that are lacking in the literature on IT-enabled innovation.

1.4.2 Relevance and gaps in the literature

The following three major field observations (components of the research model) have barely been addressed in the literature and justify the importance of pursuing the current research and further research drawing upon the final results in this research: (1) the way IT governance can lead to exploration and more radical innovation as opposed to exploitation, cost reduction and efficiency, (2) the important role of external IT partners in strategic IT initiatives and in the

governance system that enables senior managers to steer these initiatives, and (3) the need to account for the project arrangements and mechanisms that are needed to address high levels of uncertainty and change in the context of IT.

Innovation typologies and IT-enabled innovation

Two relevant typologies found in the literature can be combined and applied to strategic IT initiatives. The first uses three types of innovation outcomes (process, product and market) and the second uses two types of innovation outcomes (exploitative / efficiency-oriented and exploratory / innovation oriented). Three gaps are found in IT-enabled innovation literature:

1. The relationship between IT and innovation is not viewed from a project perspective where uncertainty is higher, change is more frequent and critical project-based mechanisms must be taken into account.
2. Inter-organizational relationships are almost non-existent. Authors who look for links between IT and innovation limit their research to the firm's internal activities and underestimate the importance of managing external relationships.
3. The concept of governance has been introduced by a few authors, but not developed to explain the relationships between IT and innovation.

IT alignment and governance

The IT alignment and governance literature clearly shows a growing interest in understanding and promoting the relationship between IT, strategy and competitive advantage. However, the literature is limited in the following way:

1. The studies focus on the efficiency component of strategy (exploitation) as opposed to its innovation component (exploration).
2. IT governance focuses on intra-organizational relationships and existing models largely ignore the connections between IT initiatives and innovation.

3. Authors who study inter-organizational relationships and relational governance only look at ongoing client-supplier relationships in IT outsourcing or supply chain processes (as opposed to project-based relationships).
4. There is a divide between (1) the literature that looks at IT governance and the strategic alignment of IT (the internal perspective), and (2) the literature that studies IT outsourcing and relational governance (the external perspective).
5. Inter-organizational governance (relational governance) was not previously studied in the context of strategic IT initiatives with the aim to drive business innovation from the buyer's perspective.

There is still no agreement on the definition of IT governance, and the lack of IT governance continues to be an epidemic today in IT (UcedaVelez, 2009). Moreover, most authors and managers understand the defensive nature of IT that increases efficiency but very few understand its offensive nature that leads to innovation and growth. IT governance is still weak in explaining how project and portfolio related organizational structures, processes and relational mechanisms can be linked in a framework to enable the control of innovative and complex IT initiatives. The normative IT governance techniques reviewed (COBIT and ValIT) clearly emphasize cost management and efficiency as opposed to innovation. Furthermore, although project management governance mechanisms are accounted for in the frameworks, they focus on the normative project management principles (emphasizing cost, delay and quality) that are weak for managing change, uncertainty and innovation.

Project management alternatives and project governance

Authors searching for alternative approaches to the normative project management techniques suggest conducting research to connect the one-off and short-term project arrangements to the long-term organizational logics and processes using qualitative research methodologies that include the social actors. They also advance the importance of finding project management models that allow for more innovation and that have the capacity to address higher level of uncertainty, complexity and change.

Three types of studies of strategic IT projects were found: (1) the success factors of enterprise systems (focused on ERP projects), (2) agile project management in IT (middle management), and (3) the real options approach applied to IT project (ignores relational mechanisms). None of the studies found used the governance approach as an alternative to manage strategic IT projects for innovation.

The gaps in the literature in project management and project governance can be summarized in the following way:

1. In general, alternative approaches to normative project management techniques are needed to study and manage complex and strategic IT projects where uncertainty is higher.
2. The concept of project governance is still not well defined in the literature and it has not been applied in the context of strategic IT projects.
3. There's a segmentation in project governance: (1) one school of thought focuses on intra-organizational governance and the connections between project management and corporate governance (Turner, 2006; Weaver, 2007; Müller, 2009), and (2) the other focuses on project arrangements in large engineering and public projects and largely ignores intra-organizational relationships (Miller and Lessard; 2001; Flyvbjerg, 2003).

Drawing upon the literature review, the project governance approach found in large engineering projects could be combined to IT governance theory to study and reflect realities in strategic IT projects and in turn to explain the links between the high-level strategic management of the IT initiatives and the innovation outcome that leads to growth. This combination could significantly expand and improve the governance approach in the context of strategic IT initiatives by adding the critical project-based and inter-organizational mechanisms that are traditionally ignored in the IT literature (in IT governance and IT-enabled innovation) because of the way IT is generally related to exploitation and efficiency as opposed to exploration and innovation.

The results here clearly show the need for a more systemic approach to governance that could help IT managers and executives make better long-term decisions that leverage both their internal and external relationships in complex and dynamic project settings. This governance approach could help bridge the gaps found in the IT literature and reconnect the three perspectives found: (1) the intra-organizational perspective that focuses on IT alignment and governance, (2) the inter-organizational perspective that looks at ongoing client-supplier outsourcing relations, and (3) the project perspective that largely ignores the governance concept and higher-level decision-making processes.

CHAPTER 2: THE RESEARCH METHODOLOGY

In this chapter, the research question and topic will be presented first and then the chosen theory-building methodology and research process will be explained.

2.1 The research motivation and question

In this section, the initial observations and the research questions are presented. Although the research question evolved and was refined throughout the various iterations, it is presented prior to the methodology and analysis phases for practical reasons.

The preliminary observations

Research missions conducted prior to this research as part of the MINE project including a mission in California's Silicon Valley led to the following initial observations[11]:

- Providers of R&D and engineering tools (software) rely extensively on sponsors who buy their systems and pay for new developments and innovations.
- IT system providers work in partnerships with both large industrial firms and IT consulting companies to co-develop new IT products and innovate.
- The innovation process is driven by close collaboration between firms in projects and the buyer often leads the IT-enabled innovation process.

These preliminary missions shed light on new patterns of innovation, a new game of innovation, where a network of IT firms work together with expert industrial buyers in project settings to build and integrate innovative IT systems and software tools. The observations in the preliminary research missions led to the same unanswered questions as noted in literature about the way firms manage and structure their strategic IT initiatives for innovation.

[11] Interviews and case studies were conducted with companies like Autodesk, Dassault Systèmes, PTC, Cadence, SAP, Agile and Accelrys. These companies had already been surveyed with a quantitative online tool.

Defining the research question and objective

The findings and observations in the preliminary research missions triggered the interest for conducting the present research and contributed to the formulation of broad research questions. Nevertheless, the research questions were also shaped and confirmed by an extensive literature review presented in the previous chapter. In qualitative research, questions can be triggered by field observations but the variables and themes employed need to be of theoretical interest (Corbin and Strauss, 1990; Fernandez et al., 2002; Desgagné, 2005; George and Bennett, 2005).

Drawing upon the initial field observations and the gaps initially identified in the literature, the research started with the following two motivations: (1) understand why firms embark on strategic IT initiatives and in what ways these initiatives lead to innovation, and (2) explore the governance systems used by senior managers to successfully manage these strategic IT initiatives for innovation.

Following the final iterations of the literature review, pertinent innovation typologies (general and IT-based) were found in the literature and applied to the context of strategic IT initiatives to create the typology used in this research. As a result, the first research motivation was removed and the research topic was narrowed down to the following question:

- What governance systems and mechanisms are created and used by senior managers to manage strategic IT initiatives according to the various types of innovation these initiatives create?

The overall research objective is thus to understand the relationship between strategic IT initiatives and innovation from a governance perspective. In other words, to identify the key governance mechanisms (comprising decision processes and rules, relational mechanisms and high-level organizational structures) used by senior IT managers that induce the desirable behavior and lead to value creation and innovation.

The research question is depicted in the following initial research model where the IT governance system (in the context of strategic IT initiatives) leads to innovation:

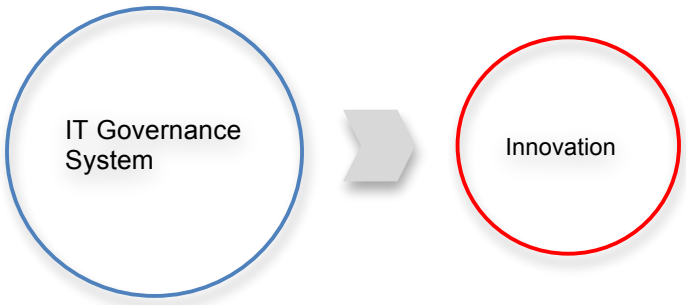

Figure 2-1 Initial research model

The evolution of the research model is one of the core characteristics of the qualitative theory-development research process adopted. The model evolved through four stages, one initial stage, two intermediary stages and one final stage.

2.2 The qualitative theory-building approach and process

In order to answer the broad question presented in the previous page and to research the emerging, complex and dynamic event of strategic IT initiatives drawing upon the emerging fields of IT-enabled innovation and governance, the Grounded Theory (GT) theory-building qualitative approach was chosen (Corbin and Strauss, 1990; Paillé, 1994; Laperrière, 1997).

Using the taxonomy proposed by Colquitt and Zapata-Phelan (2007) for selecting the research methodology and theoretical aim of the research, the research question that examines the previously unexplored relationship between governance and innovation in the context of strategic IT initiatives would clearly require a theory-building approach (as opposed to a theory-testing approaches). However, the research will also test to some extent and expand the extant theory in IT governance by including the inter-organizational dimension found in project settings as well as the exploratory innovation concept found in product and market innovations (as opposed to process innovations and efficiency). Given the research object, themes and question, traditional experimental and quantitative research or hypothetico-deductive theory-testing approaches would clearly not be plausible for this research.

Although the case study method (Eisenhardt, 1989; Geroge and Bennett, 2005) is more frequent in IS/IT research than GT, Fernandez et al. (2002), suggest using GT as an overarching methodology that provides rigour and relevance. Because there is a lack of applied research in the field of IS/IT innovation, the authors suggest employing methods that do not rely on prior theoretical foundations. According to them (Fernandez et al., 2002), research undertaken with emergent IS/IT issues has three fundamental characteristics: (1) IT systems are hybrids of human, social and technical research objects, (2) the research objects (interaction of technology, organizations, groups and individuals) do not lend themselves to quantitative measurement and require a qualitative mode of enquiry, and (3) because the research themes are new, researching them will involve building new theory rather than deductively extending existing ones. In sum, to understand how governance varies in strategic IT initiatives according to the type of innovation it aims to create, an empirical GT approach is selected with a focus on building a new theory through an inductive process using qualitative data (mainly interviews).

The theory-building GT approach is chosen as an overarching methodology (Corbin and Strauss, 1990; Paillé, 1994; Laperrière, 1997) and two GT-compatible analysis techniques are added to it in the process: (1) typological analysis (Desgagné, 2005), and (2) qualitative content analysis (Corbin and Strauss, 1990; Hsieh and Shannon, 2005; Suddaby, 2006). Regardless of the level of care and rigor, any theorizing remains partial, limited and relative to the context of the research (Paillé, 2004). However, it is not an excuse for a lack of methodology (Suddaby, 2006).

The GT process has a lot in common with the Case Study process (Eisenhardt, 1989; George and Bennett, 2005) in that a theoretical sampling process (that requires several iterations of data collection and interviews) is needed until conceptual saturation is achieved. The difference however is that a Case Study research can be conducted with only a few cases (3-4 cases for example) using a vertical intra-case data collection process (several interviews per case) whereas the GT approach in this research draws upon a broad and horizontal sample of cases (strategic IT initiatives) and respondents in various industries and focuses instead on the research model, concepts and typology (as opposed to the case) to build a new mid-range theory. The table

below presents the major characteristics of the GT overarching approach used and the two compatible analysis techniques that are combined in the process.

Table 2-1 The GT approach and analysis techniques used in the research

Approach	Main authors	Key characteristics
The Grounded Theory (GT) approach in general	- Laperrière (1997)[12] - Poupart et al. (1997) - Paillé (1994) - Corbin and Strauss (1990) - Glaser and Strauss (1967)	- Concepts and hypotheses are built and verified progressively throughout the field research process. - Data collection and analysis are done in parallel. - Theory is grounded in facts and reality rather than literature. - Enables the development of managerial models. - Categories are progressively constructed, consolidated and their frequency and extension is examined and interpreted.
Typological analysis	- Desgagné, (2005) - Kleiber (1990)	- The typology (families) can emerge through the data collection process and once a sufficient number of cases analyzed. - A new typology can also be explored and built around an existing typology. - GT drives the process that leads to the creation of the typology (families).
Qualitative content analysis	- Elo and Kyngas (2007) - Suddaby (2006) - Hsieh and Shannon (2005) - Robert and Bouillaguet (2002) - Corbin and Strauss (1990) - Krippendorff (1980)	- The practice of combining qualitative and quantitative methods is encouraged. - Qualitative content analysis does not produce counts and statistical significance; instead, it uncovers patterns, themes, and categories important to a social reality. - Counting the occurrences of categories helps the researcher understand the category's dimension and importance throughout the material (interviews) - Content analysis can be used with either qualitative or quantitative data and in an inductive or deductive way - Inductive content analysis is used in cases where there are no previous studies dealing with the phenomenon or when it is fragmented

The focus of the GT approach is the conceptualization and a progressive theorization grounded in qualitative facts (Paillé, 1994). Conceptual categories emerge from a coding process where several iterations lead to conceptual saturation. The coding process is open at the beginning and closed (axial) at the end. Although a GT analysis can be designed through a single iteration, with for instance 10 interviews conducted and transcribed (Paillé, 1994), it was conducted in several iterations in the current research.

[12] Laperrière (1997) compares Grounded Theory to Ethnography and the Mixed Approach by Miles and Huberman. As opposed to Grounded Theory, Ethnography is a qualitative approach with a descriptive aim. Ethnography is used to understand and compare cultures, it does not allow for theoretical sampling, inferences or the development of managerial models. The Mixed Approach focuses on the exhaustive description of one single situation and provides strong tools for understanding management cultures and dynamics. The Mixed Approach is empirical and allows for inferences.

Typological analysis can be adopted as a component of the GT approach and aims at grouping cases (stories) into families (types with various orientations) through the transformation of the voices of the various respondents into one single voice (the researcher's voice) and using prototypes for a refined characterization of each family (Desgagné, 2005). These prototypes according to Desgagné have two aims: (1) they provide an analytical base for the rest of the qualitative content, and (2) they represent a major portion of the research results. Furthermore, the categories produced at the end of the categorization process (following the coding process) are in themselves central research results that do not require further analysis (Paillé, 1994).

Table 2-2 Summary of the research design adopted

The precise research objectives	Explore the governance systems and mechanisms used by senior IT managers in strategic IT initiatives and understand how they vary according to the types of innovations they aim to create.
The subclass of events	The subclass of events investigated is the strategic IT initiative that has a significant importance for business strategy, that creates value through innovation, and that generally implies an important set of internal and external stakeholders and relationships.
The research method	- The theory-building and qualitative GT approach is adopted as an overarching method and combined with two compatible and enhancing analysis techniques: (1) typological analysis, and (2) qualitative content analysis. - Theory building (as opposed to theory testing) as well as the development of a coherent and practical governance model is the focus of the method. The research will conclude with a recapitalization of the major findings. - New themes, hypotheses and relationships will be identified through several iterations (field interviews, open coding, axial coding, typological analysis, and qualitative content analysis). - Interviews with senior IT managers will be conducted and a number of strategic and transformational IT initiatives will be sampled, analyzed and compared until conceptual saturations is achieved.
The specification of variables	- The dependent variable is the innovation outcome of IT initiatives for the buyer - The independent/intervening variables are the governance systems used. - The research will focus on the variation of the independent/intervening variables (governance).

In the typological analysis conducted by Desgagné (2005), the typology of five families emerged from the initial sample of 20 cases (interviews) through a qualitative coding process. However the characterization of the typology was refined in a second coding iteration that only used the prototypes (two prototypes per family). In contrast, an innovation-based typology was taken from the literature in this research to group the sample of strategic IT initiatives in three families, to explore the relationships between governance and innovation, and in turn to explore a new governance-based typology based on those relationships. Similarly, the characterization of the governance-based typology in this research was refined through a new iteration of qualitative

analysis, interpretations and comparisons using a set of three prototypes in each family of strategic IT initiatives. In the process followed by Desgagné (2005), the transition from the narrative posture (the voice of respondents) to the interpretative posture (the voice of the researcher) was drastic whereas in the process followed in this research the transition is progressive and driven by a number of iterations. These iterations are described in the research process phases presented below.

It is important to note at this point that although GT is not to be confused with qualitative content analysis (Paillé, 1994; Suddaby, 2006), the latter can be combined with GT to improve and refine the analysis and typology (Corbin and Strauss, 1990; Laperrière, 1997). The qualitative content analysis technique consists of measuring frequencies of theme occurrences to refine the comparison of themes (categories) across cases and interviews (Krippendorff, 1980; Suddaby, 2006; Elo and Kyngas, 2008). Also, because the study design and analysis are unlikely to result in coded data that can be compared meaningfully using statistical tests of difference, the use of rank order comparisons of frequency of codes can be used (Curtis et al., 2001; Hsieh and Shannon, 2006; Elo and Kyngas, 2008).

In order to follow a scientifically sound process with a difficult and open-ended methodology like GT, the canons and procedures suggested by Corbin and Strauss (1990) were used to guide the research. These include the following: (1) data collection and analysis are interrelated processes, (2) concepts (themes) are the basic units of analysis, (3) categories must be developed and related, (4) sampling proceeds on theoretical grounds, (5) analysis makes use of constant comparisons, (6) patterns and variations must be accounted for, (7) process must be built into the theory, (8) writing theoretical memos is an integral part of doing grounded theory, (9) hypotheses about relationships among categories are developed and verified as much as possible during the research process, (10) a grounded theorist need not work alone, and (11) broader structural conditions must be brought into the analysis, however microscopic in focus is the research.

Moreover, the 14 criteria (questions) suggested by Corbin and Strauss (1990), were taken into account to test and validate the research process throughout its various stages. The first set of criteria is related to the research process and the second set to the way findings are empirically grounded.

Finally, two important risks according to Fernandez et al. (2002) that researchers face when conducting a GT process in IT/IS research were taken into account: (1) minus-mentoring, or using the GT method for the first time without the guidance of a supervisor with practical knowledge of the methodology, and (2) the increased difficulty of GT when the researcher has no substantial experience as a practitioner in the field of IT.

2.2.1 Overview of the five phases of the research process

The research was conducted in several phases and literature reviews, field interviews and qualitative analyses were conducted in parallel through several iterations. The processes and practices suggested in the literature on GT were analyzed and compared to find the right process for this research. The GT processes proposed by authors like Laperrière (1997) and Desgagné (2005) inspired the process used in this research. Laperrière (1997) for instance proposed the following four steps: (1) definition of the research topic, (2) selecting the site, group or situation to study, (3) elaborating the conceptual categories, and (4) the coding process and comparative analysis. On the other hand, the GT-based typological process suggested by Desgagné (2005) was composed of two major phases: (1) the restitutive phase, and (2) the analytical phase. The outcome of the typological analysis in the second phase is a function of the quality of interaction between the researcher and the respondent that enables a transparent and complete narration (emphasized in the first phase). Although the processes proposed by Laperrière (1997) and Desgagné (2005) have their own specificities, both process draw upon the same GT approach and principles. See the appendix for a comparison of the processes adopted by the authors.

The qualitative content analysis technique was used in the final analysis phase to enhance the comparative analysis and the research results in general. Drawing upon the GT processes found in literature, a process composed of five steps (phases) was adopted to conduct the research.

These five phases follow the initial phase (presented earlier in this chapter) that consists of defining the preliminary research questions and the key concepts and variables (Glaser and Strauss, 1967; Eisenhardt, 1989; Corbin and Strauss, 1990; Laperrière, 1997; Desgagné, 2005)[13]. The table below describes each of the phases of the process adopted:

Table 2-3 The five research phases used in this research

Phase	Key activities	Outcome
1. First exploration phase: first data collection iterations and first intermediary model	- Interviews with senior IT managers in Canada and India. - Preliminary data analysis through several iterations (using the Nvivo software). - Literature review in parallel.	- 46 senior managers interviewed and 13 cases of strategic IT initiatives covered. - Observation of IT trends and innovation logics. - Three major literature streams explored. - **First intermediary research model where the 3 dimensions of governance were introduced: (1) intra-org., (2) inter-org., and (3) project.**
2. Second exploration phase: final sampling iteration and conceptual saturation	- Interviews with senior IT managers in France (CIGREF). - Literature review in parallel.	- 6 new senior managers interviewed and 5 new cases integrated in the research. - Theoretical sampling completed with 18 cases of strategic IT initiatives. - Tentative coding grids (Nvivo).
3. First analysis phase: the full qualitative analysis of all 18 cases	- Coding (open and axial) of interview data through 7 iterations until conceptual saturation reached. - Using the Nvivo software. - Extraction of secondary themes from the model.	- 18 cases analyzed and used to refine the research model. - **Second intermediary research model.** - **Conceptual saturation** - More focused literature review.
4. Second analysis phase: the typology and prototypes	- Typological analysis, and the creation of innovation-based families of IT initiatives. - Selecting prototypes.	- Sample of 18 cases split in 3 families using an innovation-driven typology - 3 prototypes per family of IT initiatives.
5. Third analysis phase: governance links to innovation types and qualitative content analysis	- Qualitative content analysis to refine the research model. - Comparative analysis and the exploration of links between governance and innovation.	- Research results organized in 3 parts (the 3 governance axes) - **Final research model.** - **Theoretical implications clarified.**

[13] While the pure sociological approach in GT only allows for literature review and epistemological positioning once the data is collected from the field (Desgagné, 2005), a literary approach was introduced early in this research to make theoretical and scientific sense. In consequence, the literature review started at the beginning of this research and was conducted in parallel to the field exploration and qualitative analysis.

In the next pages the two exploration phases and the three analysis phases are introduced.

Phase 1: Field exploration and the first intermediary model

This phase consisted of selecting the right group to study, conducting field interviews and building the core concepts of the research grounded in the realities observed in the field. It is the longest phase of the research conducted with over 45 respondents in Canada and India. The purpose was to obtain a minimum number of relevant interviews (complete, strategic and holistic) to explore the major concepts of the research model through a number of coding iterations where the cases are compared and the major pertinent categories identified. The phase consisted of a theoretical sampling process conducted in parallel with the analysis and comparison of the cases using notes as well as the Nvivo software through which tentative classification structures (grids) are generated.

This highly exploratory phase was critical because it helped prepare for the final sampling iteration that was more focused and conducted through a final research mission in France. The phase also consisted of a more in depth literature review leading to a convergence between the practices explored in the field and the theory found in the literature. This convergence led to the creation of the **first intermediary model** in which the themes of the central category (the governance system) were structured in three dimensions through open and axial coding: (1) intra-organizational, (2) inter-organizational, and (3) project.

Phase 2: Final sampling iteration and conceptual saturation

The first intermediary model built in the previous phase helped prepare for a final research mission that was conducted in partnership with the CIGREF (Club Informatique des Grandes Entreprises Françaises) in France in which six highly senior respondents were interviewed and five new cases analyzed and compared to the previous cases. This phase is the final theoretical sampling iteration that led to conceptual saturation, one of the major GT conditions.

Phase 3: First analysis phase: the full qualitative analysis of the 18-case sample

Once the research interviews with the CIGREF were completed, the strategic IT initiatives for which a sufficient amount of information was collected through the interviews were identified. From over 25 cases covered during the interviews, 18 cases contained enough data for a comparative qualitative analysis in which strategy, governance, and innovation topics were covered. Moreover, questions about the strategic motivations behind the IT initiatives and the satisfaction of the respondents were used to make sure the selected cases were strategic and successful to a certain extent.

This first analysis phase was conducted before creating the typology (separating the sample in families) and consisted of coding in detail the interviews of the 18 strategic IT initiatives (using the qualitative analysis software Nvivo) and refining the research model. Because of the way this phase was instrumental in the evolution of the research model, it is presented in more detail in a separate chapter (Chapter 3). **The second intermediary model** was obtained at the end of this phase.

Phase 4: Second analysis phase: the typology and prototypes

At this stage, an innovation-based typology was created by adapting existing typologies found in the literature and the sample was split into three families of strategic IT initiatives: (1) efficiency-oriented, (2) mixed, and (3) growth-oriented. Following the recommendations of Desgagné (2005), a few prototypes were selected for each type of strategic IT initiatives (3 per type) for practical reasons including the comprehensive description of each type and the subsequent analysis and presentation.

Phase 5: Third analysis phase: governance links to innovation and qualitative content analysis

In this phase, the innovation-based typology built in the previous phase was used to explore a governance-based typology. In other words, the phase consists of discovering the governance links to the three types of innovation in the context of strategic IT initiatives. This phase represents the major results of the research in that the way the three governance axes vary

according to the type of innovation in strategic IT initiatives is explored and described with the various qualitative nuances. The qualitative content analysis technique is used in this phase to structure the results and to compare the three governance axes along the families of IT initiatives. The structure created by the use of frequencies made it possible to analyze and interpret the very large amount of data. At the end of this phase, **the final research model** (reflecting the differences between the types of innovation) is obtained. Furthermore, the research results are not presented according to the typology. Instead, the results are structured along the major dimensions of the research model, the three axes of governance.

2.2.2 The two exploratory and iterative phases

These two first phases drove the convergence of the practices of senior IT managers explored in the field and the relevant theoretical perspectives and concepts found in the literature. The result is an improved version of the research model where the major governance categories are identified as well as a theoretical sample that led to conceptual saturation.

Phase 1: Field exploration and the first intermediary model

This first exploratory phase led to the creation of the first intermediary model (presented later in this section) where the major categories were built through the first open and axial coding iterations. Like described by Corbin and Strauss (1990) and Fernandez et al. (2002), this long, open and complex phase required a high toleration for confusion and regression, an openness to emerging evidence (that may change the course of the research) as well as an ability to conceptualize to derive theory from the data.

Designing the research instrument

Given the richness and inherent complexity of the research object (strategic IT initiatives), and because a single event can be relevant for research on a variety of theoretical topics, the research instrument (questionnaire) was built with a clear theoretical and conceptual view.

The research questions were kept broad enough and flexible to allow for richness and nuance in the results. The questionnaire had two aims: (1) first to confirm that the IT initiatives discussed

were strategic and resulted in one or more types of innovation, and (2) second to explore the rich and creative governance systems and mechanisms put in place and used by the senior IT managers in their initiatives. The following table presents the research instrument used:

Table 2-4 The research instrument

1. Strategic Motivations & Issues	Why did you undertake the initiative? - Strategic motivations? - Essential for operations? - Legacy systems and obsolete technologies? - Competition? - New capabilities? - Market creation and innovation?
2. **Governance system and project characteristics**	What are the major project attributes? - Size and budget? - What types of partnerships were created? How was the initiative planned and implemented? - What were the major steps and episodes? - Methods and tools used? - Who was in charge of project management? What governance and control mechanisms were used? - How important were contracts? - What committees have you put in place? - Who were the decision-makers and who was leading? What were the key roles? - How were relationships structured with suppliers, vendors and consultants? - What major governance rules were used? - What performance criteria did you use? What uncertainties, risks and difficulties did you address? - Internal versus external uncertainties and changes and their effects? - How did you react? - What conflicts did you face and how did you address them? - How was the change process managed?
3. Innovation	What was the impact on innovation? - How innovative was the initiative? - Was a new market created? - What new capabilities and systems were developed through the project? - To what extent was the new system co-developed or co-innovated? - How successful was the project?

While the structure of the initial research model was embedded in the questionnaire, more precise questions for each category of the model (governance system and innovation) were later asked to trigger discussions, provide feedback and guide the respondents during the interviews.

Respondents were not expected to respond in the same way and some need additional pointers and more precise questions to understand the questions.

Getting ready for field exploration

The discussion questionnaire is not the only preparation needed before conducting field interviews. More importantly, the principles of qualitative research need to be understood by the researcher before going in the field for interviews. The researcher has to get ready to adopt a highly collaborative, comprehensive and interpretative attitude, allowing the respondents to adopt a deliberate mode of narration (Corbin and Strauss, 1990; Poupart et al., 1997; Desgagné, 2005; Cicmil, 2006). Furthermore, the researcher has to know how to engage the respondents in stimulating and creative discussions allowing for new themes and concepts to emerge.

Here are the major rules that guided the field exploration (second research phase):

- Understand that the chosen qualitative approach represents a significant challenge as it involves more uncertainty and ambiguity than traditional positivist research, and demands a high level of communicative skills, a richness vocabulary, sensitivity to moral and ethical issues, and a wide theoretical repertoire.
- Create an appropriate atmosphere during the interviews to allow for an open and creative communication and to engage and stimulate the respondent.
- Communicate the goals and the definitions of the major themes to the respondents (prior to the interview) in order to expect answers to be comparable.
- Help the respondents focus on one single initiative and talk about their practices.
- Get the respondent to adopt a deliberate mode of narration (focused on decision-making).
- Ask questions in a way to get the respondent to describe his actions and decisions and the various episodes of the story and event.
- Transcribe the interviews, co-produce the stories and make sure the respondent's logic is preserved with a high level of loyalty.
- Do not rush into the quantitative analysis of qualitative content. When the studied event is dynamic and complex, preconceived quantitative questionnaires are weak and can lead

incoherent data. Conceptual saturation and the understanding of the qualitative distinctions come prior to content analysis and the measurement of occurrences.

Moreover, important mechanisms were used to make sure the respondents would focus on one single event, talk about their practice, and provide answers that are as comparable and as objective as possible:

- Respondents were contacted prior to the interview and briefed by phone about the research project's objectives, scope, model and major themes.
- They received a letter requesting the interview and explaining in more detail the research project's objectives, scope, model and major themes.
- They were reminded in person right before the interview about the project's objectives, scope, model, and major themes.
- More elaborate explanations of the themes in question and more precise questions were given at the appropriate time throughout the interview depending on the respondents' capacity to make the link between the broad themes and their practices.
- Practical examples of answers taken from other case studies were given when the questions were not clear enough for the participant.

Theoretical sampling and the collaborative interviews

The interviews conducted took place in various geographical areas. However, these locations (cities) are not used to compare cases and are only presented to provide more insight into the international scope of the research. In qualitative research projects, randomization is not the appropriate sampling method. Instead, conceptual saturation has to be attained through a process of theoretical sampling to validate the theory (Laperrière, 1997). In other words, the pertinence of the interviews is more important than their number. Data collection was conducted using the theoretical sampling method of the GT approach where coding is conducted simultaneously. The process only stops when conceptual saturation is reached with the available data.

Two types of IT managers were interviewed: (1) internal IT managers (mostly CIOs), and (2) external IT managers (senior consultants and account managers at the top IT service providers such as IBM, TCS, Accenture and Capgemini). The senior managers interviewed were asked to talk about the major IT initiatives they were managing or they had recently managed. The respondents proposed the initiatives they regarded as the most innovative for their business.

In this first phase (before conducting the final sampling iteration), 46 senior IT managers were interviewed at 25 leading firms in different sectors between Canada and India. About half of the firms were suppliers of IT services, software providers or consultants like IBM, Dassault Systèmes, and TCS and the other half were lead users of innovative IT systems.

The selection of the senior IT managers for interviews was driven by the following factors:

- The IT initiative had to be strategic, transformational and innovative (innovative from a process, product or market perspective).
- The initiative had to be mainly about software (as opposed to hardware).
- The senior manager had to be in a position with a high potential of providing the responses, insights and perspectives relevant with regards to the research objectives.
- The initiative had to be completed recently or in its final stages.

The first series of interviews in this first phase were conducted in Canada and comprised three types of respondents: (1) lead users in industries like the aerospace industry, the financial industry and services, (2) IT consulting firms like CGI, IBM and Capgemini, and (3) IT vendors like Dassault Systèmes and UGS. The second series of interviews was conducted in India and focused on IT consulting companies such as Infosys and TCS. These interviews were very challenging because it was harder to get the respondents to focus on one single project and event and to address the buyer's implications with enough depth.

The first intermediary research model

The first intermediary model developed in this phase is a major accomplishment of this research because it was creatively constructed by converging the practices of senior IT managers found in the field and the relevant theoretical perspectives found in the literature. This was only possible through a preliminary qualitative analysis of a number of interviews. In the process, first, open coding generated a large number of categories, and second, axial coding enabled the grouping of the large number of themes in the central governance category into three sub-categories. Although a new structure of the research model was obtained at the end of this phase, the conceptual saturation was still not fully attained and more interviews had to be conducted.

At this point, the governance system at the core of the research model contained the following three distinct categories: (1) project governance, (2) intra-organizational governance, and (3) inter-organizational governance. Here is a illustration of the first intermediary model:

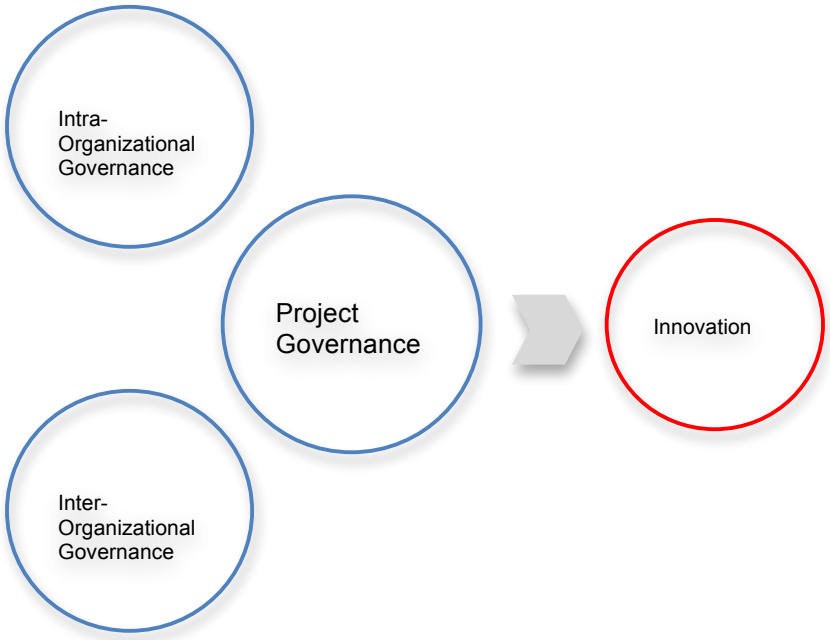

Figure 2-2 First intermediary research model

Phase 2: Final sampling iteration and conceptual saturation

As previously mentioned, the second phase consists of the last sampling iteration that was needed to stabilize the research model and reach conceptual saturation. This final sampling was conducted in France in collaboration with the CIGREF, a major association gathering some of the top CIOs in the world. Most of the senior IT managers interviewed in France were CIOs of leading French companies in various industries like the defense, the entertainment, and the food industries. Only one interview was conducted with a senior IT consultant. Additionally, the president of the CIGREF who is also the CIO of one of the leading IT user in France was interviewed for this research.

The ISPIM (International Society for Professionals in Innovation Management) is another professional association that was used for feedback and to further validate the pertinence of the research topic and model from an innovation management perspective. This was done by participating in several ISPIM conferences and symposiums around the world.

In the two exploratory phases, each case of strategic IT initiatives comprised more than a single interview with a senior IT manager. In fact, project descriptions, press releases, white papers and other types of communications on each IT project and its underlying technology were obtained and analyzed. Furthermore, in some cases interviews were conducted with several respondents who brought highly insightful information that helped detail the case. The interviews could not be very effective if information on the firm, the respondents, the project and the underlying technologies were not analyzed prior to the interviews.

Moreover, because GT authors do not recommend working alone (Corbin and Strauss, 1990; Fernandez et al., 2002), most interviews were conducted with Dr. Roger Miller, the supervisor of this research. His involvement made it possible to meet and interview the right people for the research, the senior managers and CIOs who are the key decision-makers in these strategic IT initiatives.

2.3 Research methodology conclusions

This chapter presented the GT approach selected, its requirements and the way it was adapted to answer the research questions. The research motivation and question were first presented followed by the theory-building and qualitative process. Moreover, the first two exploratory phases were presented including the field exploration and theoretical sampling process. The research model progressively evolved in the exploratory phases of the research and the governance system category was split in three axes: (1) project, (2) intra-organizational, and (3) inter-organizational. The first intermediary research model was created.

The sampled cases in the first two phases will be used to conduct a full qualitative analysis (coding) to obtain a conceptually rich model focused on the governance of strategic IT initiatives that lead to the various types of innovation. The full coding process presented in the next chapter shows how the conceptual saturation was obtained with the sample of 18 cases.

PART 2: ANALYSES AND RESEARCH RESULTS

CHAPTER 3: THE CODING AND CATEGORIZATION OF THE 18-CASE SAMPLE (FIRST ANALYSIS)

In this chapter, the first analysis phase is presented. This phase consists of two parts: (1) the selection of a sample of 18 relevant cases from over 25 cases explored in the field, and (2) the full coding of the 18 cases using Nvivo (software) to build the final categories and themes of the research model.

3.1 The sample of 18 strategic IT initiatives

As Corbin and Strauss (1990) put it, sampling in a GT process proceeds on theoretical grounds. This is exactly what was done in this research to select the final sample of 18 cases. In other words, the sampling proceeded in terms of the core concepts of the research question (strategy, governance and innovation) as opposed to a specific group, technology or industry. The cases and interviews selected for the full coding and categorization using Nvivo software had to share the following characteristics (some of these characteristics were already used to select cases in the previous phase, for the field exploration):

1. The buyer is a leader in the industry.
2. The initiative is regarded as innovative and successful and the respondent is satisfied.
3. The IT initiative is software-based and strategic for the buyer and the major partners.
4. The respondent is a senior IT manager who is in a position to provide information that is strategic and relevant.
5. The initiative is completed or in its final stages.
6. The interviews are focused on a single initiative.

Given the highly exploratory nature of the sampling process in GT (especially at the beginning of the process), not all the cases were theoretically relevant and some were lacking insight into the core concepts of the research and had to be removed from the research sample (about 7 cases were removed). Therefore, the final sample coded and used to build the research model with all its categories and themes was brought down to 18 cases. As previously said, the 18 initiatives

were not selected randomly but were instead chosen for their ability to answer the research questions. Also, the number of cases and interviews with senior IT managers was constrained by the available resources and time. The sample is thus one of theoretical pertinence and convenience and not a statistical representation. This table provides key size and performance metrics for the buyers in the 18 initiatives.

Table 3-1 Overview of the buyers in the 18 studied IT initiatives

IT BUYER (USER)	INDUSTRY	REVENUES 2011 (million) – approximate in CAD (rates of December 2012)	EMPLOYEES (2011)	SALES PER EMPL. (million)	BUSINESS TYPE / HEAD-QUARTERS
ENERGY	Utilities / Electrical Power	$12,390	22,500	0,551	Crown Corp. / Montreal
AEROSPACE1	Aerospace & Defense	$12,940 (2010)	35,500 (2009)	0,364	Subsidiary (public) / Montreal, Canada
AEROSPACE2	Aerospace & Defense	$8,600	33,600	0,256	Subsidiary (public) / Montreal
DEFENSE	Defense & ICT	$16,770	63,730	0,263	Public / France
ELECTRONICS	Electronics / Manufacturing	30,000 (2008)	60,000 (2008)	0,500	Public / IL, USA
BANK1	Financial Services	$8,373 (2008)	41,921 (2008)	0,200	Cooperative / Levis, Canada
BANK2	Financial Services	$7,483	21,320	0,351	Public / Denmark
INSURANCE	Financial Services	$1,700 (2008)	2,200 (2008)	0,773	Public / Montreal
FINANCE	Financial Services	$1,337 (oper. income)	3,900	0,343	Stock exchange / Switzerland
POST	Courier / Retail	$7,729 (2008)	72,000 (2008)	0,107	Crown Corp. / Ottawa
HEALTH	Healthcare	$0,255 (budget, 2008)	4,200 (2008)	0,061	Government / Montreal, Canada
OPTIC	Medical Equipment	$5,400	48,700	0,111	Public / France
THEME PARK	Tourism & Media	$1,995 (2008)	13,000 (2008)	0,153	Subsidiary (public) / France
RESORTS	Tourism	$2,240 (2008)	20,333 (2008)	0,110	Public / France
FOOD	Food Processing	$24,850 (2010)	101,000 (2010)	0,246	Public (SA) / France
RETAIL	Retail / Distribution	$2,660	7,500	0,355	Public / Montreal, Canada
TOYS / MANUF.	Toys Manufacturing	$0,376	1,000	0,376	Public / Montreal, Canada
TOTAL	**12 industries**	**$143,761**	**552,404**	**0,262 (average)**	

Metrics like revenues, profits and sales per employee (SPE)[14] are good indicators of the buyers' size, performance and leadership in their industries. The buyers chosen in the current research are leaders in their respective industries and many have been historically lead users of innovative information systems. For instance, the early information systems built for insurance companies and the postal system in North America in the 19th century are the progenitors of the current widely used enterprise systems particularly the ERP system.[15]

In many of the IT initiatives studied, the buyer pushed for strategic and innovative IT systems that resulted in important breakthroughs in the industry and in all of the projects important business transformations (including business process reengineering, business integration and the replacement of legacy systems) were undergone to some extent. The table below describes the 18 software-based initiatives in the selected sample:

Table 3-2 Brief descriptions of the 18 IT initiatives selected (cont'd)

Project / Location	Buyer	Description	Size estimate	Duration estimate
CRM / Montreal	ENERGY	- Integrating and adapting a large SAP CRM (Customer Relationships Management) platform for satisfying the company's clients (all Quebec residents) in response to changing needs triggered by the service and marketing improvements of companies like telecom operators, cable TV companies and Internet companies. The project was conducted in partnership with Capgemini, SAP and other small firms.	*$450-500 million*	*2000-2007*
CRM / Ottawa	POST	- Transforming the company's business with a complete CRM solution in partnership with SAP and Accenture. The project aimed at changing the way the company did things to reduce costs, increase efficiency and create a platform for growth including e-commerce capabilities.	$450-500 million	*2001-2007*
ERP / Paris	FOOD	- Integrating the complete MySAP ERP (Enterprise Resource Planning) suite throughout the group's units around the world and converting all the company's new acquisitions to SAP for business integration and control. Building a strong relationship with SAP, becoming a global reference in ERP and in turn influencing the platform's evolution. The project also aims at educating people and creating strong links for knowledge transfer between IT and the business units; the competency center is a major mechanisms created with the project.	*$400-450 million*	*2001-2008*

[14] According to Richard Nolan (2000), the Sales per Employee (SPE) figures indicate the positive impact of IT on a company's performance and profitability and SPE correlates with IT-leveraged revenue-generating activities in the firm.

[15] The developments of the punch-card tabulating system developed in the early 20th century by IBM and Remington Rand were sponsored and driven by the post office, insurance companies and the military.

Table 3-2 Brief descriptions of the 18 IT initiatives selected (cont'd)

CRM / Paris	RESORTS	- Developing a custom CRM platform including a Website and marketing channels (with e-commerce) enabling the mass customization of marketing and sales processes and allowing the transition from a BtoB to a BtoC distribution strategy.	*$100-150 million*	*2002-2007*
BASEL II / Risk / Montreal	BANK	- Using the new Basel II regulation as an opportunity to launch a transformational project for the bank to build new risk management capabilities and to penetrate new markets in other Canadian provinces and internationally.	$120-140 million	*2002-2009*
ECM / Paris	DEFENSE	- Developing a centralized solution with an ECM (Electronic Content Management) system at its core that enables project teams to collaborate efficiently and effectively and gives every individual in the company modern productivity tools. IT architectures are centralized, travel costs are reduced with web-conferencing tools and more importantly the ever increasing activities of the company's technological projects are configured and managed on one single database enhancing the productivity of project teams in a significant way.	$90-120 million	*2006-2009*
ERP / Montreal	RETAIL	- Replacing the organization's 40 legacy systems with one ERP platform to enhance the IT capabilities and improve efficiency of the distribution and supply-chain system. Initial managerial issues forced the sponsors to replace the CIO and bring in more competent consultants who put in place more effective governance mechanisms and brought the project back on track. This strategic IT system is mission critical for the buyer because it drives its core distribution operations.	$90-120 million	*1999-2006*
ESE / India	FINANCE	- A four-year ESE (Electronic Stock Exchange) project for creating a new electronic security depository system for one of Europe's major stock exchanges. The mission critical system is a major part of the country's financial landscape on which both the banking and stock exchange infrastructures depend. The initiative was conducted in partnership with TCS in India who were also in charge of the post-implementation support and maintenance services.	$80-100 million	*2001-2005*
Applications Development (AD) / India	BANK	- Extending and improving the bank's application development (AD) capability on IBM Mainframes for their retail banking business. The Danish bank partnered with a mid-size IT services provider in India to offshore its development and support needs. The partner was selected for its strong relationship with IBM and the capabilities and competence of its IBM Mainframe Center of Excellence.	*$30-50 million*	*2005-2007*
PLM / Montreal	AEROSPACE	- Responding to competition and new regulations to build a fully integrated PLM (Product Lifecycle Management) system that would provide integration, efficiency and connect the firm to its strategic suppliers and partners. The initiative is also the result of a long-term partnership with Dassault Systèmes and IBM enabling the company to co-develop new and adapted features and functionalities in the new system.	*$30-40 million*	*2000-2006*

Table 3-2 Brief descriptions of the 18 IT initiatives selected (cont'd and end)

PLM / Montreal	AEROSP-ACE	- Partnering with Dassault Systèmes and IBM for the integration of the latest release of their PLM platform and providing feedback for the improvement of the platform in exchange for special attention and the adaptation of the system.	*$30-40 million*	*2003-2008*
PLM / Montreal	ENERGY	- Developing an innovative PLM platform in collaboration with IBM, Dassault Systèmes and SNC Lavalin and commercializing the platform on a global scale through a joint venture.	$20-25 million	*2003-2006*
DDS / Paris	THEME PARK	- Developing an innovative dynamic distribution system (DDS) for the mass customization of the company's complex offer enabling the company to shift from a BtoB to a BtoC distribution strategy of its Paris resort products. The project was conducted in a joint venture with Accenture and included several vendors.	$20-25 million	*2006-2008*
MC (Mass Custom) / Paris	OPTIC	- Digitizing the company's lens design and customization knowledge into a software product for both internal and external use. The software is connected to both the company's supply chain system and R&D function enabling the mass customization (MC) of optic lenses.	$15-20 million	*2006-2008*
PLM / India	ELECTRONICS	- The seamless extension and enhancement of the firm's product development and engineering processes through a PLM offshoring partnership and initiative with a major IT service provider and consultant in India. The initiative started with a small development contract that evolved into a larger negotiated project covering a wide range of design and engineering processes enabled by the IT partner's PLM capabilities. The result is a rationalized and more innovative PLM process for the buyer's global operations.	$15-20 million	*2005-2007*
EHR / Montreal	HEALTH	- Developing an innovative Electronic Health Records (EHR) platform in partnership with Purkinje, a world leader in EHR solutions. The project enabled Purkinje to create the first solution for hospitals by enhancing its previous platform built for clinics.	$15 million	*1999-2007*
Claims Management (CM) / Montreal	INSURANCE	- Replacing legacy systems and in-house applications particularly for claims management (CM) with an innovative integrated solution called Guidewire. The company partnered with Guidewire to build an innovative module incorporating some of the company's proprietary and core knowledge (knowledge that no other insurance company posses). The special arrangement with Guidewire allows the company to sell the module to other insurance companies and diffusing the knowledge.	$10 million	*2006-2008*
PLM / Montreal	TOYS MANUFACTURING	- Developing a custom-made PLM system using the open source PLM platform Aras Corp and the temporary support of expert consultants. Aras Corp provided the toys company special attention and discounts in exchange for feedback on the system's functionalities and code. The goal was to manage the company's Bills of Material (BOMs) more efficiently by connecting them to the current ERP system, the marketing forecasting tool and the project management system. Instead of adapting its business processes to the new PLM platform, the company decided to change and adapt the PLM system to its own processes.	$2-5 million	*2004-2007*

At least one senior IT manager in a pertinent and strategic position was interviewed for each one of the 18 cases described above. In some cases interviews were conducted with several respondents and in other cases key consultants who worked on the initiatives were interviewed. Fortunately, most of the key interviews with the CIOs and senior IT managers were recorded and transcribed which provided rich and detailed content to analyze.

The 18 cases selected and shown in the table above span various industries, geographical areas and IT platforms. Nonetheless, they are all similar in that they were driven by strategic motivations, they had an impact on innovation in some way and they were successfully completed or had successfully reached the final stages of the project. The respondents in all cases were satisfied with the results of their initiatives and in general regarded them as successful and innovative. The following excerpts indicate their satisfaction and positive feelings about the contribution of their initiatives to the business.

Table 3-3 Excerpts for respondent satisfaction in all cases (cont'd)

Project	Examples from interviews
CRM – ENERGY	- It is a super powerful tool, we moved from an old car to a new BMW. - Everything is running well, in six months the last deliverable should be completed.
CRM – POST	- We're satisfied and happy.
ERP – FOOD	- It has become something quite miraculous.
CRM – RESORTS	- If I had to restart the project I don't know if I would do it the same way. Would it be with the same tools and the same things?
BASEL II – BANK	- I would say that we were previously one of the last banks and today we are one of the most advanced banks.
ECM – DEFENSE	- The cost of this project is negligible in comparison to the valued added and benefits created, it is really clear.
ERP – RETAIL	- Today the system works really well and no one was short on [any of our products]. Our operational expenses are decreasing every year thanks to the new system.
BA – BANK	- This is important because it was an opportunity for us to show-off our competencies in consulting.
PLM – AEROSPACE2	- We were capable of obtaining a system that enhanced the performance and reduced the cost of the design and manufacturing of new assemblies.
PLM – AEROSPACE1	- But we're doing quite well up to know […]. We're taking small steps.
ESE – FINANCE	- You know this was hugely successful and that is attributed to the fact that there was an extremely well defined statement of work.
PLM – ENERGY	- We are currently in the delivery phase of the project and it's working quite well.
DDS - THEME PARK	- For the time being it is going quite well but we could go even further.
MC – OPTIC	- So we did what we had to do: show our clients that we could offer them this kind of service and at the same time block the competition.
PLM – ELECTRONICS	- Experience certainty, the ability to deliver.

Table 3-3 Excerpts for respondent satisfaction in all cases (cont'd and end)

EHR – HEALTH	- We finally found out that it was cheaper and more beneficial to digitize in color.
CM – INSURANCE	- I guess as the CIO I will tell you I have a lot of confidence in my team and we've had a lot of success in my team to do the job.
PLM – TOYS	- We are generally satisfied and the only thing I would change would be to allocate full time employees from the IT department from the beginning of the project.

All IT initiatives in the theoretical sample were strategic for the buyer and in most cases for the consulting partner and vendor as well. Non-strategic IT initiatives were excluded from the sample and only strategic projects (that could have strong effects on innovation and business transformation) were selected. The strategic importance of the IT initiatives is thus a core and critical characteristic of the theoretical sample. In consequence, to situate the sampled IT initiatives vis-à-vis their strategic importance for the buyer and partners, an analysis of the strategic motivations described in the interviews by respondents was conducted using the coding functionalities in Nvivo. Although these strategic motivations were removed from the research model, they are important because they show how such IT initiatives are triggered by a variety of factors and also provide a good account of each project's context and idiosyncrasies. The strategic importance is one of the major conditions and characteristics of the sampled software-based initiatives.

The first questions asked during the interviews were about the project strategic motivations and triggers. The analysis of the responses (conducted prior to the complete content analysis) shows that each strategic IT initiative was triggered simultaneously by about five strategic motivations. Seven primary strategic motivations were found through the analysis process in Nvivo. Appendix 7 presents the results obtained for the strategic motivations in each case including excerpts for illustration.

3.2 The coding in Nvivo and the second intermediary models

In GT (Corbin and Strauss, 1990; Paillé, 1994; Laperrière, 1997; Desgagné, 2005) and like in qualitative content analysis (Weber, 1990; Elo & Kyngas, 2007), categories need to be mutually exclusive.

The aim of this chapter is to describe the meticulous qualitative analysis process that enabled the conceptual saturation and stabilization of the research model with its core themes. The process is composed of two sub-processes (open coding and axial coding) and was conducted in seven iterations of coding and adjustments of the classification structure (conceptual categories). The process described here was constantly interrupted by literature reviews that were instrumental in shaping the final research model with its core theoretical concepts.

The analytical phase described here is the third phase in this research but the first analytical phase (in the analytical part). The second analytical phase (and last phase of this research) will be presented in the next two chapters and will combine two GT-compatible techniques: the typological analysis, and qualitative content analysis.

Open coding started as soon as the first interviews were conducted and the first versions of the classification structure were created. Once the 18 cases were selected, new iterations were conducted and the categories were refined. On the other hand, axial coding started once a few relevant cases analyzed using the Nvivo software tool. While open coding transcribes the respondents' voices into factual and loyal categories with a minimum number of alterations (abiding to the rules of pure sociology), axial coding transforms the various voices into theoretical categories in a language that makes sense to the relevant theoretical fields of the research. This complex analytical process is qualitative and creative because it relies on the analytical abilities of the researcher instead of the analytical power of existing statistical techniques. The detailed analysis process is described in the (1) qualitative analysis journal (Appendix 6) and the themes are defined in the (2) lexicon of themes (Appendix 7).

As encouraged by several authors (Suddaby, 2006), the quantitative content analysis technique was combined to the qualitative approach to give structure and show contrast in the material. Yet, content analysis was applied with a great level of precaution because quantitative techniques can give the researcher the false impression of obtaining strong results and can easily hinder and erase the prior qualitative meaning and results. To avoid falling in this quantitative trap, the

qualitative analysis using open and axial coding (grounded theorization) was emphasized and performed with a high level of care prior to content analysis and the counting of the occurrences of themes.

The description of the first qualitative analysis process presented here is a summary of the analysis journal (in the appendix) exposing the major steps taken.

3.3 The preliminary qualitative analysis in the exploratory phases

Before selecting the 18 cases and conducting the full qualitative analysis using Nvivo, a preliminary and exploratory analysis of the material was conducted. This preliminary analysis mainly happened in the second phase of this research.

The preliminary analysis process was a little bit chaotic, entrepreneurial, and hard to explain in a structured and sequential way. During this process, several trips were taken, over 50 senior IT managers were interviewed, and interviews were transcribed. Additionally, a variety of documentations on the cases were gathered and analyzed (white papers, press releases and project plans), experts were met in several conferences, industry surveys and standards were read, and finally an extensive literature review was conducted in parallel to make sense out of all the concepts and issues found. Most importantly, the preliminary analysis of the cases led to the creation of the first intermediary model with its four major categories: (1) innovation, (2) project governance, (3) intra-organizational governance, and (4) inter-organizational governance.

In short, the process through which the first intermediary model was created was intuitive and chaotic, and resulted in the creation of tentative classification structures and themes. Moreover, the analytical software tool used for the full coding of the content (Nvivo) was only used in a limited and sporadic way.

3.4 The stabilization of the classification structure and the conceptual saturation

The first 6 iterations consisted of analyzing the content of the 18 cases progressively (3 cases in every iteration) through open and axial coding consisting of: (1) the creation of new themes, (2) the merging and grouping of detailed themes, (3) the splitting of general themes, and (4) the redistribution of themes among the large categories created (the 4 blocks in the model and the Strategic Motivations and Free Nodes blocks).

While most themes in the final model were created at the end of Iteration 1 (in the analysis of the first 3 cases), a large number of adjustments and restructurings were done subsequently throughout the other 4 iterations to stabilize and simplify the model (axial coding).

A lexicon of themes was developed and maintained throughout the analysis process to constantly be reminded of the definition of the themes (categories) used and their conceptual boundaries. References to the literature were also needed to clarify the definitions.

To simplify the analysis process, the material was modularized in four chunks and addressed progressively through four iterations. Each chunk contained the central interviews of three cases and was analyzed in a separate iteration.

Even though the selection of the cases grouped in each chunk was not a critical task in the process, the groups were not completely random. Instead, the cases picked for the first iterations were those felt to provide more pertinence, richness, and nuance.

It is important to note that the numbers in the tables below do not represent the occurrences of themes in the material. Instead, they represent the number of themes (sub-categories) in each major category of the model. In this critical qualitative analysis phase (Phase 4), the number of occurrences of the themes is not important, only the meaning and quality of the themes is analyzed, and whether the themes exist in each case or not. The number of times the theme is

found in each case is not important at this stage. This table shows the number of themes in the classification structure before and after the adjustments in Iteration 1:

Table 3-4 Number of themes before and after Iteration 1 adjustments

Iteration 1 Themes	**Before Adjustments**				**After Adjustments**			
Theme blocks	1A	1B	1C	**TOTAL**	1A	1B	1C	**TOTAL**
1: Project Governance	13	5	5	**23**	10	4	3	**17**
2: Intra-Organizational Governance	11	3	0	**14**	10	3	0	**13**
3: Inter-Organizational Governance	17	3	5	**25**	13	3	5	**21**
4: Innovation & Performance	7	1	0	**8**	7	1	0	**8**
TOTAL	48	12	10	**70**	40	11	8	**59**

The columns show the number of themes created during the analysis of each one of the first three cases (1A, 1B and 1C) for every block in the model. After Iteration 1 adjustments (columns on the right), the total number of themes was brought down to 59 from 70 and many themes (categories) were merged to create more inclusive and relevant ones. A total of eleven themes were removed and their content re-coded with other more general themes. Below are a few examples of the adjustments that led to the reduction of the number of themes in Iteration 1:

Table 3-5 Examples of Iteration 1 adjustments

Theme	**Iteration**	**Blocks impacted**	**Adjustments**
1. Technical Difficulty	- B: BANK	- Project Governance	- Removed - Content coded in Changes and Complexity
2. Hybrid People	- A: THEME PARK	- Intra-Org. Governance	- Removed - Content coded in Team Selection Process and IT Roles and Competences
3. Offshore Development	- A: THEME PARK	- Inter-Org. Governance	- Removed - Content coded in Externalization (Outsourcing)
4. Software as Service - ASP	- A: THEME PARK	- Inter-Org. Governance	- Removed - Content coded in Contract Management
5. Special Team	- A: THEME PARK	- Project Governance	- Removed - Content coded in Project Team
6. Partner Selection >Technical & >Business	- A: THEME PARK	- Inter-Org. Governance	- Removed - Content coded in Consultant Selection Process

For all adjustments in Iteration 1 see Appendix 6. Some themes were renamed and some moved from a block to another. The other nine interviews were analyzed in the subsequent three

iterations and triggered other important changes in the classification structure / conceptual model. In Iteration 2, the number of themes increased to 70 before adjustments and then decreased to 65 after adjustments. In Iteration 3, themes reached 67 before adjustments and fell to 64 after adjustments. In Iteration 4, one theme was added and one removed maintaining the total number of themes at 64. In Iterations 5 and 6 the classification structure remained unchanged and no theme was added or removed. This table shows the evolution of the number of themes throughout the first 4 iterations in the qualitative analysis process:

Table 3-6 Evolution of the theme structure from Iterations 1 to 6

Evolution of the theme structure in Iterations 1 to 4	**Iteration 1**		**Iteration 2**		**Iteration 3**		**Iteration 4**		**Iteration 5**		**Iteration 6**	
Theme blocks	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
1: Project Governance	23	17	18	16	18	18	19	18	18	18	18	18
2: Intra-Organizational Governance	14	13	19	19	19	16	16	16	16	16	16	16
3: Inter-Organizational Governance	25	21	25	24	24	24	24	24	24	24	24	24
4: Innovation	8	8	8	6	6	6	6	6	6	6	6	6
TOTAL	**70**	**59**	**70**	**65**	**67**	**64**	**65**	**64**	**64**	**64**	**64**	**64**

Note that the following types of adjustments are not obvious in the above table:

- Renaming (and redefining) themes
- Moving themes from one block to another
- Re-coding previously analyzed content with new themes

The following graph illustrates the conceptual saturation process in the first six iterations.

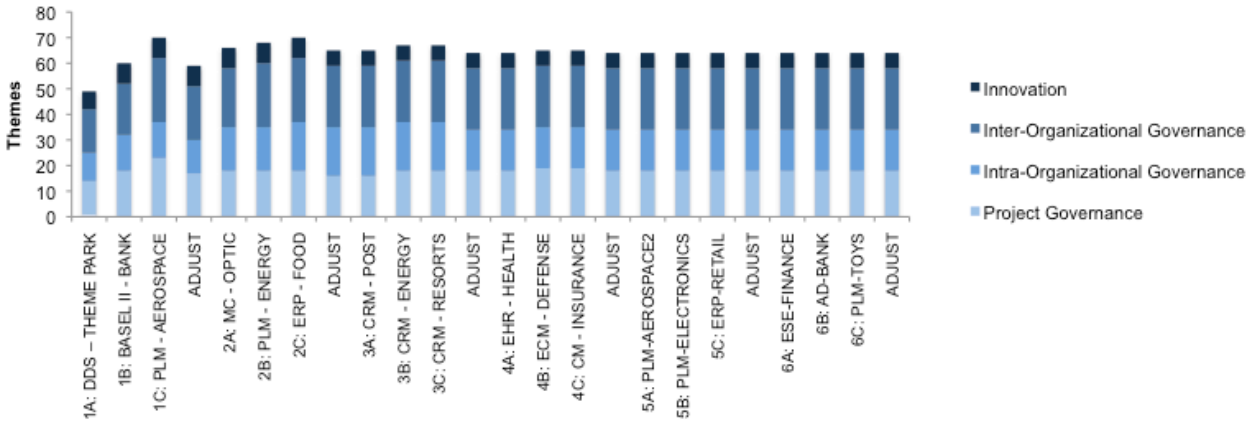

Figure 3-1 Change in the number of themes in the first six iterations

The addition of the six last cases did not affect the themes in the model at all. In other words, no new concept was added to the model with the analysis of the last six cases. The progressive decrease in the number of adjustments (themes created or removed) is an indication of the stabilization and saturation of the conceptual model and in turn of the comparability of the cases analyzed. In parallel to the stabilization of the classification structure (and the conceptual saturation), the number of references to the themes increased in a linear way. This indicates that the themes exist throughout the cases and reinforces their comparability. This graph illustrates the variation in the number of references per block at the end of Iteration 6:

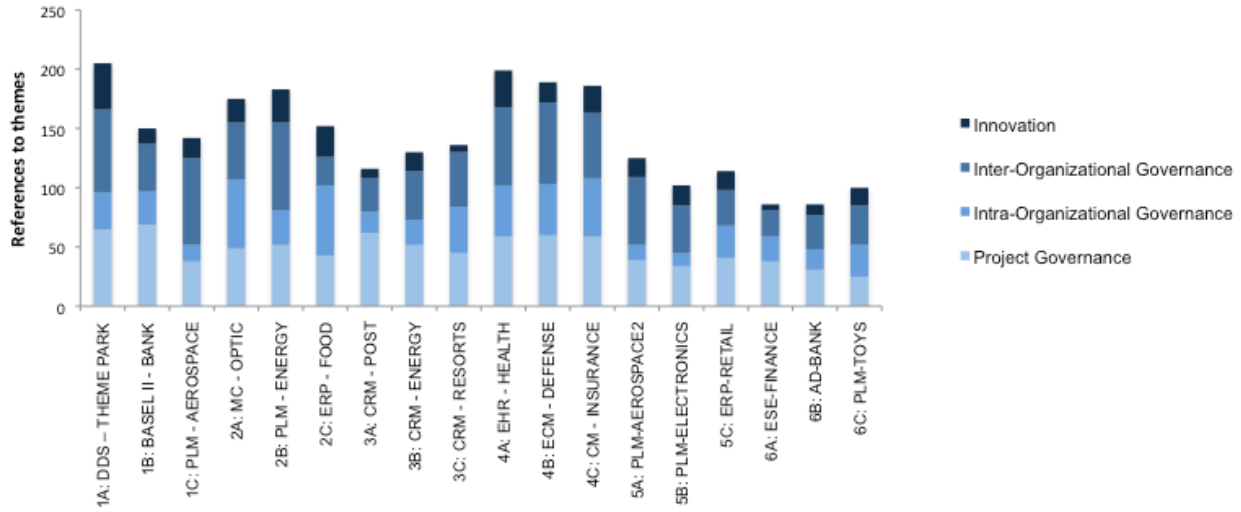

Figure 3-2 Reference variation per block at the end of Iteration 6

The average number of references per case at the end of Iteration 6 was 143 and the cumulative number of references for the 18 interviews was 2575.

3.5 Restructuring the classification structure for simplification and focus

The analysis of the results obtained at the end of Iteration 6 and the review of the research model and questions triggered a 7th and final iteration where the classification structure was restructured for the simplification of the model and the increase of the focus of the research. In the Qualitative Analysis Journal in Appendix 6, the restructuring process of Iteration 7 is explained in more detail. This simplification process consisted of the following major tasks:

- → Focus on innovation as opposed to project performance
- → Extraction of the secondary themes from the core model
- → Merging, splitting and recoding themes to reduce ambiguity

While most of the restructuring work aimed at simplifying the model, some broad themes like Performance Criteria had to be segmented (split) in a number of sub-categories for clarification. See Appendix 8 for all Nvivo exports at the end of iteration 7. This graph shows the important changes in the classification structure after Iteration 7 (Iteration 7 results exclude the secondary themes):

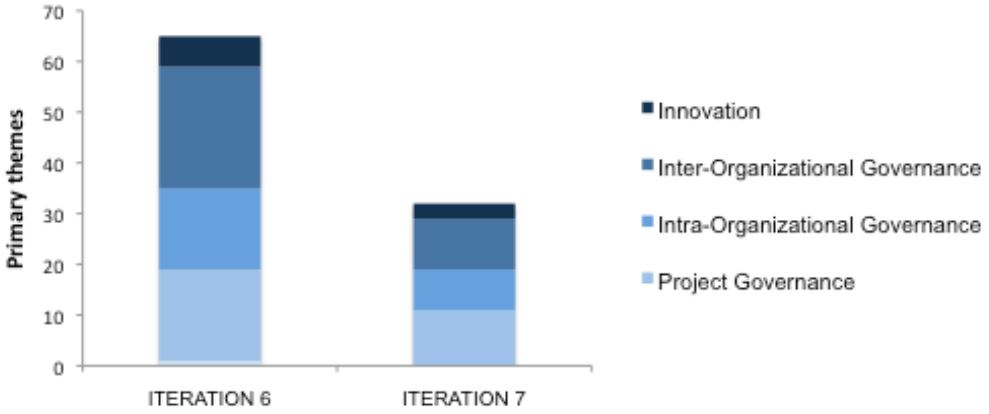

Figure 3-3 Changes in the classification structure after Iteration 7

All blocks in the classification structure decreased in size. The total number of themes fell from 64 to 31 themes in the core model and 16 secondary themes were extracted. The final set of themes in the core model is distributed in the following way:

- Block 1 (Project Governance): 11 themes
- Block 2 (Intra-Organizational Governance): 8 themes
- Block 3 (Inter-Organizational Governance): 10 themes
- Block 4 (Innovation): 2 themes

Focus on innovation (exploitative and exploratory)

Before reaching this stage of the research, project performance was still an issue that was addressed simultaneously with innovation. However, it became clear at this point that project performance (as opposed to innovation) was much less of an issue and distinction between the 18 IT initiatives in the sample. Most importantly, because all projects were relatively successful in reaching the intended strategic objectives, and were doing well from a project management perspective, the research focus could clearly be devoted to innovation from the buyer's perspective. In consequence, four themes in the Innovation & Performance block were extracted, the remaining two themes were refined and clarified, and finally the block (or category) was renamed to Innovation. See Appendix 6 for more detail.

The following four themes that were not direct indicators of innovation were extracted: (1) Performance Criteria, (2) Respondent Satisfaction, (3) Organizational Innovations, and (4) Fast Execution. The themes that reflected project performance in general were no longer necessary.

First, Performance Criteria reflected the types of performance criteria used by senior IT managers throughout their initiative to monitor the evolution of their work and make decisions. These criteria could thus be regarded as determinants of innovation (used in the governance system) and not indicators of innovation. This theme was thus moved to Project Governance.

Second, Respondent Satisfaction was too general and reflected too many types of achievements like innovation, project performance, learning, and organizational performance. This theme was removed from the model but used to examine and compare the overall success and performance of the projects from the respondents' perspectives.

Third, Organizational Innovations was ambiguous and had to be extracted because the theme drew upon many of the same meaning units used throughout the governance categories. In fact, it reflected the organizational innovations or the creative managerial approaches used by the senior IT managers that should normally be coded in the governance categories (as determinants of innovation instead of indicators). Many of these innovative managerial approaches were double coded in both the governance blocks and the innovation block, which posed a problem.

Fourth, Fast Execution reflected project performance and the normative project management criteria instead of the innovation outcome for the business. Furthermore, several meaning units (in the content) were double coded with Fast Execution and Performance Criteria (Project Governance).

The remaining two themes that are direct indicators of innovation were renamed and refined using the innovation typologies found in the literature used to distinguish between efficiency and innovation or between exploitative innovation and exploratory innovation.

First, Business Innovation was split in two themes: (1) IT-Enabled Exploitative Innovation & Efficiency, and (2) IT-Enabled Exploratory Innovation & Growth. The definition of Business Innovation was too broad and included both IT-enabled process and product innovations. The research at this point distinguished between the type of innovation that affected growth and the top line of the business, and the type affecting efficiency and the bottom line of the business. Additionally, the content was re-coded to reflect both sub-themes.

Second, the content in IT Innovations was mostly recoded with IT-Enabled Exploratory Innovation & Growth because of the way it described the market innovation and exploration results of the IT initiatives. In the context of IT initiatives, growth and market innovation imply new IT developments that are commercialized by either the IT external partner (consultant or vendor), the buyer or by both. These are hybrid innovations because they consist of commercializing sophisticated and complex business processes and best practices in software packages.

In general, there is no established way to measure innovation and from the multi-dimensional and multi-disciplinary views that exist, the two-dimensional typology (that opposes exploitative innovation to exploratory innovation) used in strategic management (March, 1997; Shapira, 1997; Saloner et al., 2001) and recently introduced in innovation studies (Miller and Olleros, 2007; Jansen et al., 2006), inspired the two categories introduced at this stage of the research to compare the innovation outcome of strategic IT initiatives.

In short, the remaining themes had the following characteristics:

- They are indicators of innovation as opposed to determinants of innovation.
- They focus on innovation for the business as opposed to project performance.
- They distinguish between two types of business innovations: (1) IT-enabled exploratory innovations for growth and effectiveness (top line) including product and market innovations, (2) IT-enabled exploitative innovation (mainly process innovations) for profit and efficiency (bottom line).
- They are mutually exclusive categories when compared to each other or to the other categories in the model (especially governance categories).

The decision to remove the ambiguous themes, to overlook project performance, and to make a clear distinction between exploitative and exploratory innovations was a major evolution in the research model that reduced the scope of the research. Instead of understanding the relationship

between governance in IT initiatives, innovation and project performance, and the research focused on the relationship between governance and innovation only.

Extraction of the secondary themes from the core model

In this iteration, 16 secondary themes were extracted from the research model. Secondary themes are rare themes that only one or very few respondents mentioned. In other words, if a theme has a high average (high density) but is only stressed by one respondent (low coverage), it is usually considered a secondary and case-specific theme. Nevertheless, certain secondary themes such as R&D Role should be used in future studies because even though they were mentioned by a small number of respondents, they could have an important effect on innovation in certain cases. This table shows an example of the secondary themes extracted from the Intra-Organizational Governance block:

Table 3-7 Example of Iteration 5 adjustments: Block 3 secondary themes

Block	Themes	Respondents	References
2: Intra-Organizational Governance	1. IT Strategy & Organization	5	15
2: Intra-Organizational Governance	2. Decentralization	4	8
2: Intra-Organizational Governance	3. R&D Role	1	10
2: Intra-Organizational Governance	4. Knowledge Management	1	3
2: Intra-Organizational Governance	5. IS University	1	2

In this part of the seventh iteration, eight themes were extracted from Inter-Organizational Governance, five themes were extracted from Intra-Organizational Governance, and three themes from Project Governance. All the extracted themes are presented in the journal in Appendix 6.

Merging, splitting and recoding themes to reduce ambiguity

Several adjustments were brought to the primary themes after the secondary themes were removed from the core model. Similar (and narrow) themes like Competence Center and Shared Services (in Intra-Organizational Governance) were merged together, and broad themes like Strategic Motivations were split. Furthermore, themes that were not completely mutually

exclusive like New Capabilities (Strategic Motivations block) and IT-Enabled Product Innovation (Innovation block) were compared and recoded. See the appendix for more examples.

The following graph illustrates the variation in the number of references per block throughout the 18 cases at the end of Iteration 7 (the end of the overall categorization process):

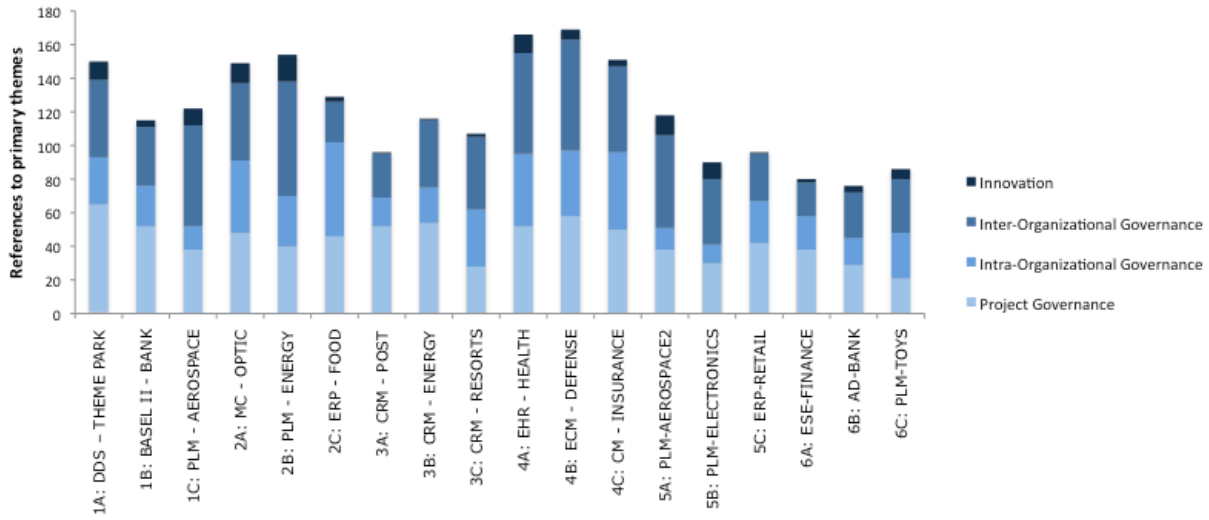

Figure 3-4 Variation in references throughout interviews at the end of Iteration 7

The references per case portrayed above exclude all the secondary themes. The total number of references fell to 2190 and the average references per case to 122 in comparison to 2575 and 143 respectively before the final adjustments in Iteration 7.

The exact numbers after Iteration 7 adjustments are presented in the table below.

Table 3-8 Scores of all primary themes after Iteration 7 adjustments

Theme references (final results)	1A: DDS-THEME PARK	1B: BASEL II-BANK	1C: PLM-AEROSPACE1	2A: MC-OPTIC	2B: PLM-ENERGY	2C: ERP-FOOD	3A: CRM-POST	3B: CRM-ENERGY	3C: CRM-RESORTS	4A: EHR-HEALTH	4B: ECM-DEFENSE	4C: CM-INSURANCE	5A: PLM-AEROSPACE2	5B: PLM-ELECTRONICS	5C: ERP-RETAIL	6A: ESE-FINANCE	6B: AD-BANK	6C: PLM-TOYS	**TOTAL**	**AVERAGE**
Project Governance	63	52	38	49	40	46	52	52	28	52	55	50	38	30	42	37	29	21	774	43.00
Intra-Organizational Governance	30	22	14	46	32	47	17	21	34	43	37	46	14	11	25	19	16	27	501	27.83
Inter-Organizational Governance	54	35	60	47	71	24	26	33	42	60	63	51	55	39	28	20	27	32	767	42.61
Innovation	11	5	8	11	14	9	8	9	6	10	7	4	12	9	7	7	5	6	148	8.22
TOTAL	**158**	**114**	**120**	**153**	**157**	**126**	**103**	**115**	**110**	**165**	**162**	**151**	**119**	**89**	**102**	**83**	**77**	**86**	**2190**	**121.67**

The block with the largest number of references is Block 1 (Project Governance) followed by Block 3 (Inter-Organizational Governance). Case 4A (HER-HEALTH) has the largest number of references (165) whereas Case 6B has the smallest number (77). See Appendix 8 for the tables exported from Nvivo detailing the number of references to each one of the themes in the four blocks of the research model as well as the secondary themes and the descriptive themes (excluded from the research model) in the Free Nodes and Strategic Motivations blocks.

3.6 The second intermediary model

On the next page is the second intermediary model (Figure 3-5) obtained at the end of Iteration 7 before conducting the in-depth qualitative analysis of the themes and before searching for inferences and relationships between the themes (the model contains 31 themes). The model excludes all secondary themes that were extracted at the end of Iteration 7.

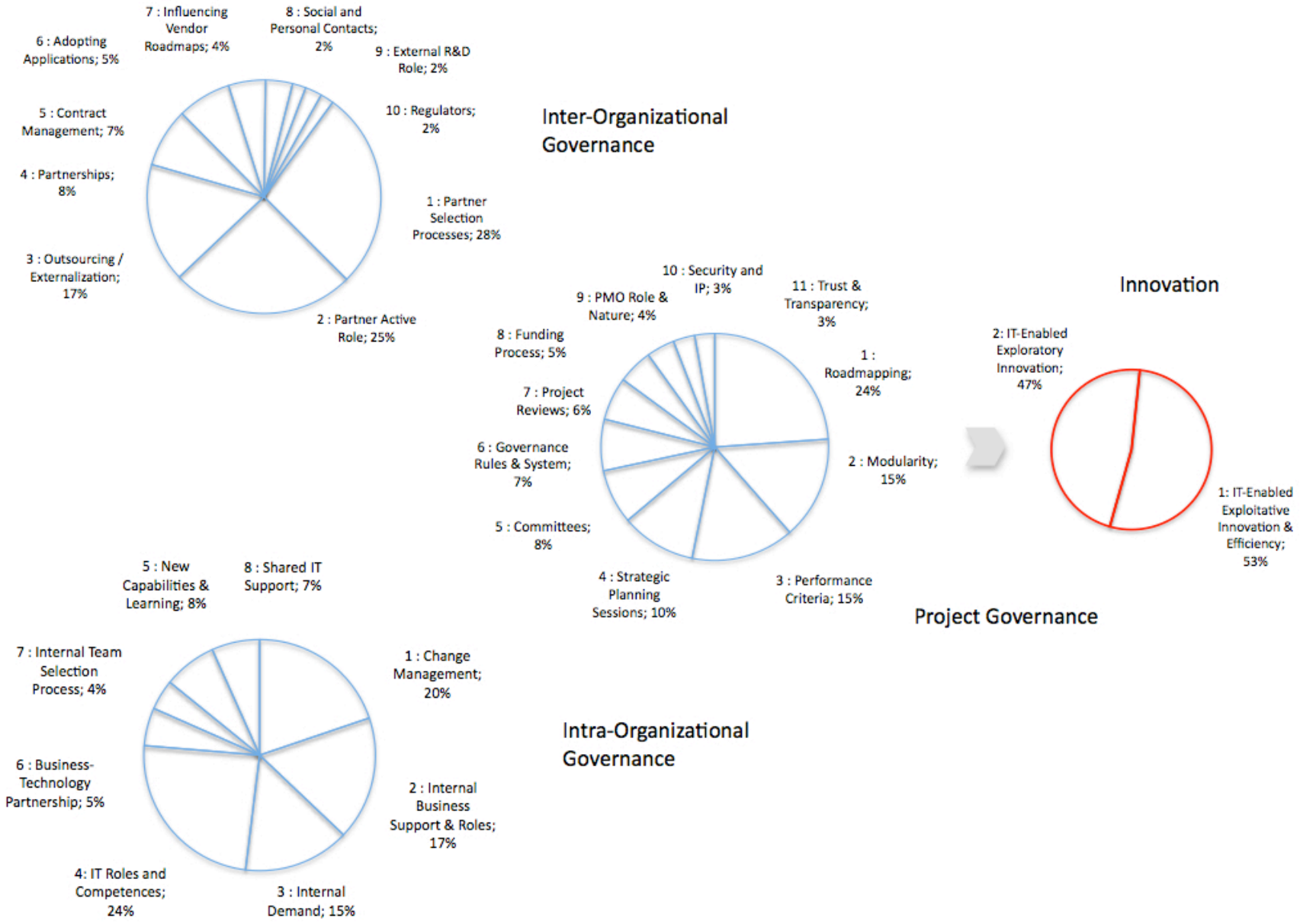

Figure 3-5 Second intermediary model

CHAPTER 4: THE INNOVATION-BASED FAMILIES AND PROTOTYPES OF STRATEGIC IT INITIATIVES (SECOND ANALYSIS)

The purpose of this chapter is twofold:

1. Create innovation-based families of strategic IT initiatives using the relevant innovation typologies found in the literature.
2. Select prototypes in each family to push the analysis further, highlight the key characteristics of each family and refine the research model.

The innovation themes analyzed in the current chapter that will lead to the creation of the families of strategic IT initiatives are in the Innovation block of the research model presented below.

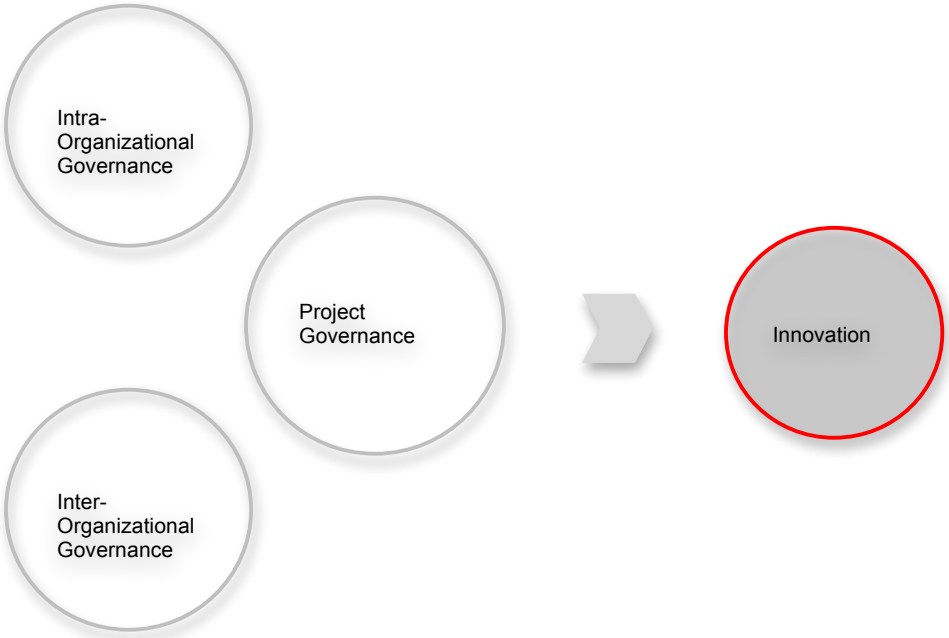

Figure 4-1 The IT-Enabled Innovation Block

The innovation-based families of strategic IT initiatives created will be used in the next chapter to explore the relationships between the three axes of governance and the various types of

innovation. As previously seen in chapter 2, typological analysis (Kleiber, 1990; Desgagné, 2005), and qualitative content analysis (Suddaby, 2006) are the two GT analytical techniques used to create the families of IT initiatives and explore the relationships between governance and innovation. It is important to note that the occurrence of a theme in a case (whether the theme occurred or not) is more important than the frequency of occurrences (the number of times the theme occurred). The themes in the research model will be organized according to the occurrence of themes first and to the frequency of occurrences second. Moreover, the frequencies of occurrences will not be used to conduct any kind of statistical analysis. Both techniques will simplify the model, highlight the key and primary themes, help organize and manage the rich and complex content, and identify the major distinctions between families of IT initiatives.

4.1 Types and scores of IT-enabled innovation

A priori, according to the respondents, all of the 18 strategic IT initiatives in the sample seem to have (up to a certain extent) positive effects on innovation. Nevertheless, the respondents had not made the distinction between the IT-enabled transformations leading to efficiency and those leading to innovation.

Drawing upon both the cases and the IT-Enabled Innovation literature, IT-enabled innovation can be divided into the following four categories:

1. IT that leads to cost reduction, efficiency and operational excellence through the automation of standard business processes (this is the lowest level of innovation).
2. IT that leads to process innovations and in turn to increased efficiency and enhanced quality of products and services.
3. IT that drives the firm's ability to innovate through systems and tools of measurement, experimentation, collaboration and replication. These capabilities include R&D-marketing integration and IT-R&D integration.
4. IT that pushes the envelope for market creation, strategic renewal and more radical innovation.

In general, the first and second levels of IT-enabled change lead to (1) efficiency through exploitation, and the third and fourth levels lead to (2) innovation through exploration (from the firm's perspective). Schumpeter's typology (Schumpeter, 1934; OECD, 2005a), the most common innovation typology, was considered at first to organize the cases in this study, but it was removed because of the indirect links between the strategic IT initiatives and product innovation (as opposed to process and market innovations). Although the IT initiative can drive the firm's ability to innovate through systems and tools of measurement, experimentation, collaboration and replication, the initiative's link to the firm's product innovation is more difficult to examine than its link to process or market innovation. In consequence, the two-dimensional typology that opposes exploration to exploitation or innovation to efficiency was chosen to guide the rest of the analysis in this research. This two-dimensional typology will be used in the coming sections of the thesis to compare efficiency-oriented IT initiatives to growth-oriented initiatives. The typology was inspired by past research comparing exploitative innovation to exploratory innovation (Jansen et al., 2006; Miller and Olleros, 2007, 2008) and efficiency to innovation (Prahalad and Krishnan, 2002; Abecassis-Moedas and Benghozi, 2012).

The table below presents the scores for the two innovation types (themes) obtained at the end of the coding process in Nvivo.

Table 4-1 Scores of Innovation themes

Innovation Themes	1: DDS - THEME PARK	2: BASEL II - BANK	3: PLM - AEROSPACE1	4: MC - OPTIC	5: PLM - ENERGY	6: ERP - FOOD	7: CRM - POST	8: CRM - ENERGY	9: CRM - RESORTS	10: EHR - HEALTH	11: ECM - DEFENSE	12: CM - INSURANCE	13: PLM-AEROSPACE2	14: PLM-ELECTRONICS	15: ERP-RETAIL	16: ESE-FINANCE	17: AD-BANK	18: PLM-TOYS	**TOTAL**	**% OF CASES COVERED**
1: IT-Enabled Exploitative Innovation	3	3	4	2	2	8	8	9	6	2	4	2	3	2	7	7	3	3	**78**	**100%**
3: IT-Enabled Exploratory Innovation	8	2	4	9	12	1	0	0	0	8	3	2	9	7	0	0	2	3	**70**	**72%**
TOTAL	**11**	**5**	**8**	**11**	**14**	**9**	**8**	**9**	**6**	**10**	**7**	**4**	**12**	**9**	**7**	**7**	**5**	**6**	**148**	**100%**

The first innovation theme in the above table (IT-Enabled Exploitative Innovation & Efficiency) occurred in 100% of the cases and a total of 78 times. On the other hand, the second innovation theme (IT-Enabled Exploratory Innovation) occurred in 72% of the cases and a total of 70 times. Interestingly, the intensity (frequency) of the second theme (IT-Enabled Exploratory Innovation) is higher in the cases where it occurred. The chart below shows the share of both innovation themes according to their overall frequency but does not reflect the percentage of cases covered by each theme (presented in the above table).

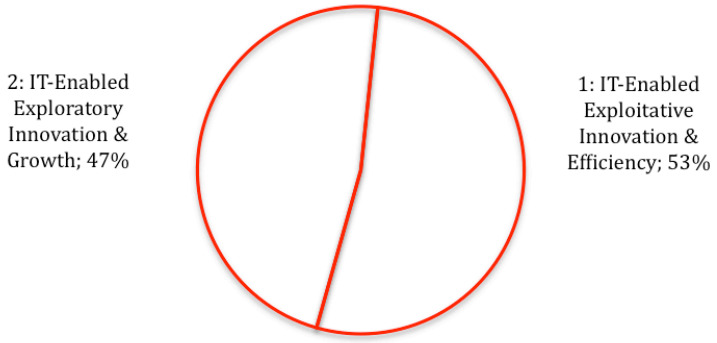

Figure 4-2 Relative intensity of Innovation themes

i) IT-Enabled Exploitative Innovation & Efficiency

IT-Enabled Exploitative Innovation is about process innovation and the significant changes and improvements in business processes leading to increased efficiency and enhanced quality of products and services. In other words, it is about the extension of existing knowledge and products for existing customers. The results show that all strategic IT initiatives have an impact on exploitative process innovation to some extent. Here is a good description of the way the new EHR system enhances the quality of the medical service through critical process innovations:

> *The system demands medical, professional and even administrative rigor [with] all the administrative tools used to manage all this such as the treatment episode tool. […] Therefore it was necessary to apply such rigor to the treatment units, with the instruction: you have to say that this particular patient came in today, as I will then use this to create an episode in my file.*

The table below presents interview excerpts for this innovation theme.

Table 4-2 Excerpts for IT-Enabled Exploitative Innovation & Efficiency

Project	Examples from interviews
CRM-ENERGY	- *It is a business transformation project combined with or supported by systems reorganization that enabled us to accomplish our two objectives, which are: provide high levels of service to our Quebecois clientele and improve subsidiary profitability.* - *We improved our processes and the IT supporting our processes.*
ERP-FOOD	- *This has been a radical transformation, completely radical.* - *It was in the group's advantage for small subsidiaries to use the same processes, for systems to be scalable, i.e. for such subsidiaries to become 8 times larger so these systems could grow with them.* - *We got to productivity optimization, that we achieved by a certain heightened form of corporate governance, by organizational decisions as well as MODs, which are really management organizational rules for the group, something completely new in terms of group culture at the time.*
CRM-POST	- *This business transformation initiative enabled us to change the way we did things to: (1) reduce our operating costs, (2) become more efficient, and (3) create better platforms for growth.* - *We reduced our operating costs and became more efficient.*
ERP-RETAIL	- *The process changes brought by the ERP are reducing our operational expenses year after year.*
ESE-FINANCE	- *So the first kind of innovations we saw are things that give you incremental benefits, so typically efficiency innovations. Incremental innovations in project processes, deliverable performance, and incremental improvements to the outcome of the project. We delivered IT modules that led to business process innovation and had positive impacts on business performance.*
EHR-HEALTH	- *Another function, less talked about, is the completion of the electronic file archive system, because this system has a major impact on work organization in the archives. A productivity rate in excess of 30% in comparison to the paper period has been mentioned.*
CRM-RESORTS	- *And by way of reminder: innovation through utilization. This is exactly what we are doing.* - *Overall, in the competitive environment I am working in today, we improved efficiency and I rule out the normative side, which does not exist.* - *Therefore when you are on this type of thing, you are on an extension or a radical innovation.*
PLM-AEROSPACE1	- *It also helps reduce the amount of errors, and when you find a problem it becomes much easier to go back and identify the source of the problem. If you talk to the users, they will tell you it used to take 30 minutes to do that know it takes 5 minutes.* - *We have an efficient product development solution where you can create and produce things efficiently; it's an integrated system.* - *We replaced these legacy tools with an integrated PLM solution, which improved productivity.*
ECM-DEFENSE	- *With respect to calls for tender there is scope for much greater professionalization of response and call for tender methodologies.* - *There are […] savings directly associated with the IT project, we centralize architectures, we operate them using less personnel therefore it costs less.*
BASEL II-BANK	- *There is a great deal of innovation regarding new ways of doing things.* - *Because as we changed our ways of doing things a lot, we involve all levels, employees, managers, everyone has been impacted practically overnight.* - *It is not technological innovation that we got but better tools and a better understanding of what is happening in the field, especially in the markets, it involves a lot of mathematical models, it involves a lot of simulations.*
AD-BANK	- *New business processes are completed that guide the development of new applications for the bank.*
MC-OPTIC	- *With the new system we have an extremely accurate statistical series which enables us to find out when we have a new product, to calculate and say that we are going to make [e.g. for myopia] a particular percentage on the -2, a particular percentage on the -3, etc.*
PLM-ENERGY	- *With respect to innovation, […] the famous AB (As Built), if […] you request a small unit overhaul you will not find the drawings, so we found ways of scanning in 3D and integrating it into CATIA. We introduced AM (As maintained). Now we have AB, and AM and we can make the correlation.*

Although most of the large IT initiatives that represent major business transformations (such as CRM and ERP projects) lead to higher levels of efficiency, respondents primarily linked these efficiencies to business transformations and integration, process automation, and cost reduction as opposed to business process innovation.

ii) IT-Enabled Exploratory Innovation & Growth

IT-enabled Exploratory Innovation is about the pursuit of knew knowledge and the development of new products for emerging customers (including IT-based breakthroughs). This innovation theme is associated to improvements of the firm's top line (as opposed to its bottom line). The theme includes both IT-enabled product and market innovations. Nevertheless, the market innovation component of this theme is more significant than its product innovation component. This innovation theme occurred in 72% of the cases.

IT-enabled market innovations are system innovations or new software developments that result from the IT initiative and that are commercialized and sold to other firms in the same industry or other industries (improving the offer on the market). Also, initiatives with no initial intent to stimulate innovation and growth often end up having positive impacts (sometimes unexpected) on innovation and growth especially on an IT system level. This process can be extremely beneficial for both the system supplier and the buyer, who collaborate in an open innovation fashion. On the other hand, IT-enabled product innovation includes new product and service developments and significant improvements driven by new tools and systems for design, measurement, experimentation, collaboration and replication. This table presents interview excerpts for IT-Enabled Exploratory Innovation:

Table 4-3 Excerpts for IT-Enabled Exploratory Innovation & Growth

Project	Examples from interviews
PLM-ENERGY	- *In PLM we now have people who are there to develop new markets, yes.* - *We told ourselves it's basically almost the same thing: a large project, but the big difference is that when building a boat there is no cement involved and there is a [hull], but there is everything that we need, pipe work, all the constituent parts of an electric power station, basically it's a floating power generator. We found this to be the closest analogy.* - *If you are at the beginning of a project, say in 3D, from design through to maintenance, you have a PLM module and an ALM module, so why not incorporate all knowledge data associated with the central unit into your model? This is what we did and it was never done before in the market.*
MC-OPTIC	- *It is highly innovative; it is tantamount to the Google of optic lens calculation.* - *It is so disruptive and innovative.*
PLM-AEROSPACE2	- *I think we are driving innovation in the market with Dassault not the other way.* - *For the T4 development we were literally in the offices of Dassault to help them develop the tool.*
DDS-THEME PARK	- *There is a lot to say; firstly that we were in some respects the first to adopt this approach.* - *The results of our pre-study, framework study, that we can call feasibility-opportunity, was that we had not seen what we were proposing, done elsewhere, in an equivalent context.* - *So we can quite modestly claim that we have contributed to our partners' progress.* - *The important thing is that we built something that is both an industry reference and a solution.*
EHR-HEALTH	- *Yes, [we are] the first hospital with Purkinje products.* - *I will say, even where we are today, I know that the next stage is to say let's make available what we have inside the CSSS. It's the first final and most logical stage.*
PLM-ELECTRONICS	- *Innovation in one industry is established practices in another industry. This results from knowledge accumulation. The partnership [between the buyer and consultant] leads to new product development.* - *We created a seamless extension of the company's engineering processes and capabilities to the TCS competence center. When this extension was done, TCS could participate in product development within the master level agreement (service level agreement).*
PLM-AEROSPACE1	- *What it does is: it gives you the capability to iterate designs and explore more and much quicker, and helps better collaboration with the suppliers.* - *Fundamentally 10 years ago we were doing 6 engine projects simultaneously, now we're doing 22 projects. So something's got to be happening. It's very innovative.*
PLM-TOYS	- *Aras Corp used us and the project to improve their PLM system. The systems innovations and more importantly the PLM philosophy changes will help Aras Corp market their PLM platform.*
ECM-DEFENSE	- *We are now capable of delivering the best solutions to our clients because people work better in terms of their preparation.* - *Therefore, in the following order, firstly there is the capacity to connect people in a network and to capitalize on knowledge in the group, different units or countries.*
CM-INSURANCE	- *We're the only company I would say from a business side that understands something called Average Reserving. So we have a lot of knowledge about how you manage things like average reserving which Guidewire didn't understand before they talk to us. Now that they understand it, they're going to take that concept and module and imbed it in their system for other people.*
BASEL II-BANK	- *We concentrated to a great extent on supporting business development and it was a winning formula.*

The new IT systems include capabilities to link the various departments of the firm that have key roles in the innovation process such as R&D and marketing. New IT applications improve quality and create new capabilities that substantially increase the value created for the end-user. In the case of the hospital, the project gives the IT team a powerful new role because the team

has control over the system that monitors the quality of the hospital staff's work. In the MC-OPTIC case, the new system allows for product innovation and more customization of the optic lenses. Here is how the respondent describes the effects on product innovation:

> *It's increasingly customized, it's relentless, it's now possible to make products that take the internal geometry of the eye into account: difference in position between the center of rotation and the optical center.*

In the PLM-ENERGY case, IT-Enabled Exploratory Innovation showed the highest score. IBM and Dassault Systèmes invested over $1 million in R&D at the front-end of the project to build a prototype of the solution they had imagined. The solution was then co-developed by the buyer, the IBM-Dassault Systèmes coalition and the buyer's key engineering partner, SNC-Lavalin. The DDS-THEME PARK case was similar to the PLM-ENERGY case in that the buyer partnered with the consultant (Accenture) to build the new solution and then to resell it to competitors in other markets. In both cases, the partnerships enabled the buyer to build a new business model, enter a new market, generate additional revenue and enhance competitiveness. On the other hand, in the MC-OPTIC case, the buyer launched an innovative product on the market (they refer to as the Google of optic calculations) without a major partner.

In the EHR-HEALTH case, the EHR system led to the development of a new solution for hospitals by scaling up smaller solutions that had previously been developed for clinics. The solution was also adapted to work on the level of the CSSS health networks. Similarly, the complex needs of one of Quebec's largest hospitals pushed the vendor to innovate and build a strong solution for hospitals, which in turn opened up a whole new market for the supplier. The hospital pushed the vendor (Purkinje) to innovate and, in exchange for this risky early-adopter position, was able to obtain attractive discounts and preferential treatment. In the PLM-AEROSPACE1 case, the PLM project was not directly intended to stimulate engine innovation but instead to reduce the cost and time of the engine development process especially by connecting the R&D and engineering teams with the company's suppliers and major clients. Nevertheless, the project had a positive impact on IT innovations and the vendor used it as an opportunity to learn and create new features for future releases. Interestingly, it is not only the

projects initially aimed at innovation that have an effect on IT-enabled market innovations or IT system innovations. In the ERP-FOOD case for instance, even though the food company's strategy was to focus on its bottom line (and not to innovate), the complexity of the company, its leading position in the food industry and its capacity to effectively manage its IT initiatives led the IT vendor (SAP) to pay particular attention and allocate strategic resources. The buyer in this case has become an SAP reference in the food industry and both firms went on to use the IT initiatives as an innovative case study for branding and marketing purposes. The leading positions and complex requirements of the buyers in the cases inevitably lead to the co-development of innovative modules, functionalities and methodologies with the vendors and consultants.

4.2 Creating families of strategic IT initiatives

The goal here was to group cases into families with common innovation characteristics before exploring the various governance systems used by senior IT managers according to each type of innovation. First the sample of IT initiatives was re-organized according to the scores for IT-Enabled Exploratory Innovation. The graph below shows the innovation scores obtained for the 18 initiatives:

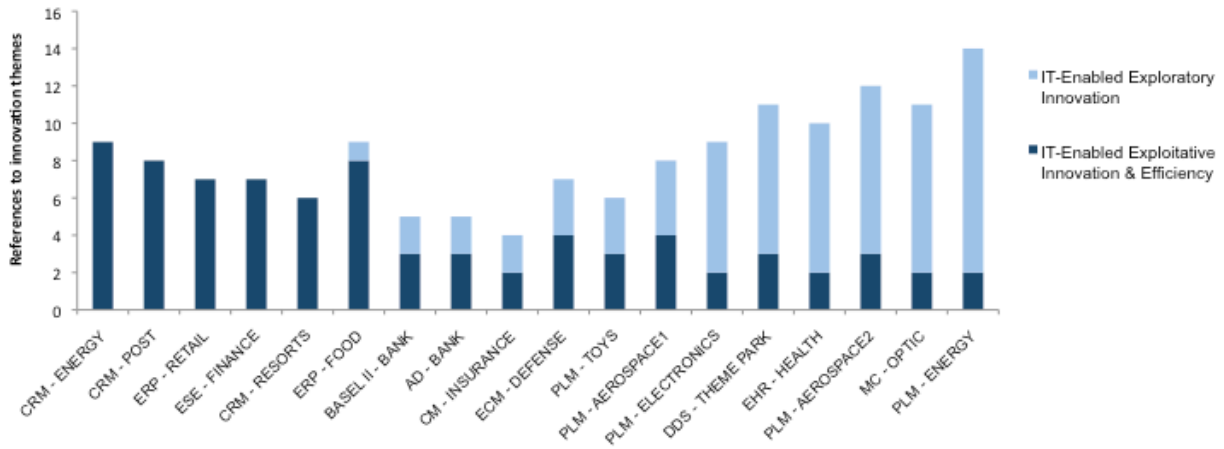

Figure 4-3 Comparison of innovation scores for the 18 IT initiatives

Using the scores for IT-Enabled Exploratory Innovation (product and market innovation) and IT-Enabled Exploitative Innovation & Efficiency (process innovation), the 18 IT initiatives can be grouped in the following categories:

1. Initiatives with a low impact on innovation and high impact on efficiency
2. Initiatives with an average impact on both innovation and efficiency
3. Initiatives with a high impact on innovation and low impact on efficiency

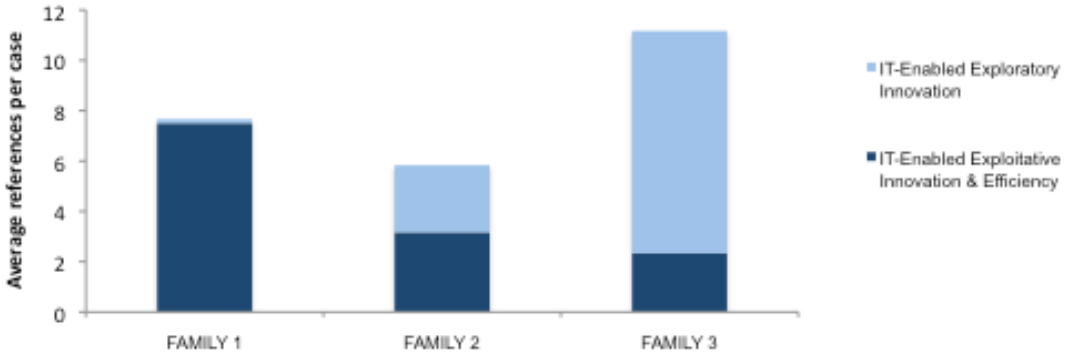

Figure 4-4 Creating families of initiatives

The three families above combine exploitative innovation and exploratory innovation in various ways. IT-Enabled Exploitative Innovation & Efficiency is clearly more important in Family 1 given the major business transformations, process innovations, and automations created by the initiatives in this family. IT-Enabled Exploitative Innovation & Efficiency is also present in all cases in Family 2 and Family 3. On the other hand, the scores for IT-Enabled Exploratory Innovation are high in Family 3, average in Family 2 and very low (almost nonexistent) in Family 1. The following table shows the cases in each family:

Table 4-4 The cases in each family of strategic IT initiatives

FAMILY 1	FAMILY 2	FAMILY 3
4. CRM - ENERGY	4. BASE II - BANK	4. PLM - ELECTRONICS
5. CRM- POST	5. AD - BANK	5. DDS-THEME PARK
6. ERP - RETAIL	6. CM - INSURANCE	6. EHR-HEALTH
7. ESE - FINANCE	7. ECM - DEFENSE	7. PLM-AEROSPACE2
8. CRM - RESORTS	8. PLM - TOYS	8. MC-OPTIC
9. ERP - FOOD	9. PLM AEROSPACE1	9. PLM-ENERGY

The table below shows the percentage of cases per family where each innovation theme was mentioned at least once.

Table 4-5 Coverage of innovation themes in the families of IT initiatives

Families of strategic IT initiatives	FAMILY 1	FAMILY 2	FAMILY 3
IT-Enabled Exploitative Innovation & Efficiency	100%	100%	100%
IT-Enabled Exploratory Innovation & Growth	17%	100%	100%

To clarify the distinction between the families of initiatives, the initiatives in Family 1 will be referred to as "efficiency-oriented initiatives", those in Family 3 as "growth-oriented initiatives" and finally those in Family 2 as "mixed initiatives". Initiatives in Family 2 combine efficiency and innovation elements and often involve large portfolios of smaller projects. For instance, the two finance initiatives (BASEL II-BANK and CM-INSURANCE) fall into Family 2 and combine a large portfolio of applications varying positions on the innovation scale. However, the more innovative modules found in the Family 2 portfolios are less innovative than those found in Family 3.

It is apparent that innovation intents and effects in IT initiatives are related to the maturity of the applications and the functionalities they support. The applications in Family 3 (PLM, DDS, MC, and EHR) are highly innovative in their respective industries whereas those in Family 1 (CRM and ERP) are mature and widely adopted in the industry. Interestingly, the projects with the largest budgets, the CRM and ERP projects, proved to be the least exploratory, the least oriented towards innovation and growth but the most oriented towards efficiency and cost reduction.

4.3 The prototypes of strategic IT initiatives

The qualitative analysis and illustration of the typical governance system and mechanisms used in each one of the families will draw upon three prototypes selected in each one of the three families of strategic IT initiatives. The typological analysis and the selection of prototypes that best characterize each type of IT initiative (and IT-driven governance system for innovation) were inspired by the method suggested by Desgagné (2005). For each one of the three families, three prototype cases were kept for further analysis and illustration using nuanced examples. The selection of the prototypes was based on the way the IT initiatives led to innovation or efficiency

and more importantly to the quality of the content provided by the senior managers interviewed and the extent to which they articulated their answers to the relevant research questions.

In the next section, the 9 prototypes of strategic IT initiatives will be introduced and the following attributes will be briefly presented: (1) the triggers and strategic motivations, (2) the internal and external networks, sponsors and stakeholders, and (3) finally the general innovation outcome of the initiative.

4.3.1 The efficiency-oriented prototypes in Family 1

This family of strategic IT initiatives is characterized by large investments in major business processes leading to large-scale business integration, major cost reductions and business process innovations. The family typically includes mature ERP and CRM platforms provided by vendors like SAP and ending up replacing a large number of legacy systems. The three IT initiatives picked as prototypes to illustrate this efficiency-oriented family are: (1) CRM-ENERGY, (2) ERP-FOOD, and (3) CRM-RESORTS.

The CRM-ENERGY initiative

The company is a large Canadian utility and major investor in R&D, innovation and IT systems. With deregulation, the company became a holding company (owned by the Quebec government) divided in four units: (1) Production, (2) Transport, (3) Distribution, and (4) Services[16]. The CRM initiative is part of the company's Distribution division. The division has two major functions: (1) maintaining and improving the quality of the distribution network and making sure the electron reaches every client, and (2) managing customer service. The CRM project was launched to improve the second function. The high complexity at the customer service and accounting levels explains the project's large budget of about $500 million[17].

[16] The Services division includes IT, HR and finance.
[17] The unit sends an average of 65,000 bills a day and receives $200 million worth of daily payments.

Table 4-6 Respondent profile and stakeholders in the CRM-ENERGY initiative

Attribute	Description
The respondent position / profile	- The respondent heads the information systems function for the utility's client services department. He has several years of experience in the company and strong relationships with corporate strategy.
The internal stakeholders and sponsors	- The project's sponsor is the VP of Sales and Client Relations in the Distribution division. - The other key internal stakeholders were: the CIO, the board of directors, and the energy department. - The company had the role of the integrator, which guarantees its control of the project.
The external network (consultants, vendors, etc.)	- The company worked with the strategy consultant PWC to define the problem and come up with an action plan. The utility also bought from PWC the global best practices in the utilities business. - The vendor is SAP and Capgemini was selected for the professional services and its IT methodologies and approaches were used. - A third party, R3D, was hired for the Project Management function. The project manager was mainly in charge of coordinating the work of project parties and managing the delivery process (including the constant changes and adaptations of the plan).

The project was triggered by a set of simultaneous factors. Deregulation is one of them, but the complications caused by the accumulation of legacy systems leading to rigidity, inefficiency and in turn the disappointment of clients were the major factors.

The project's strategic motivations, the system's new capabilities, the challenges, and the project's effects on innovation are presented in the table below:

Table 4-7 Key characteristics of the CRM-ENERGY initiative (cont'd)

Attribute	Description
Project triggers and strategic motivations	- Three major strategic axes triggered the project: (1) the client satisfaction, (2) the organization's efficiency, and (3) the satisfaction of the Quebec government (the owner). - The company's decision was based on two major criteria: (1) the customers' new needs, and (2) the global utilities best practices. - Managing the growing complexity of relationships with over 600,000 customers moving every year. - The creation of high-end jobs in Montreal by hiring Capgemini (two floors in Place Ville Marie, a major office tower in Montreal).
The system and its major capabilities	- Three SAP modules were implemented: (1) the CRM, (2) mySAP for Utilities, and (3) the Business Information Warehouse. These tools multiplied the employees' capabilities by 50. - The system simplified the business processes and rules. - The new system came with a competency center that centralized the IT support function and replaced 250 support teams.

Table 4-7 Key characteristics of the CRM-ENERGY initiative (cont'd and end)

Major challenges and difficulties	- Reengineer and simplify the business processes - Replace 250 legacy systems and run the processes with a maximum number of 3 fully integrated systems supporting 80% of the company's business processes (from 30% only) - Throughout the project, the instability of the company's senior management was a challenge. The company's chairman, the division's president and the VP for sales and customer service changed. - Manage change; motivate 6,000 employees to change their ways of functioning, assist them to unlearn the old system and learn the new one
The impact on innovation	- The project had a strong impact on process innovation and service quality and according to the respondent the company went from an old car to a BMW. Yearly benefits of at least $20 million in the processes were measured. - The major success factors according to the respondent: rigor in the method, accountability and ownership, and the way the project was modularized.

The ERP-FOOD initiative

The food company is a world leader in the food industry that specializes in dairy products, baby food and healthy organic foods. The company's spectacular growth in the past few years was accelerated by its numerous strategic acquisitions in the emerging organic business.[18]

The company's fast non-organic growth in the growing organic foods business triggered an urgent need for a global and centralized ERP platform. It was accumulating legacy systems at an alarming rate and had to quickly find a way to simplify, standardize and centralize its business processes to allow for continuous and controlled growth and innovation. The company could not only focus on its top-line anymore, it had to give more attention to its bottom-line and build a culture of productivity and optimization.

[18] For instance the company recently acquired large shares of Stonyfield Farm, the leading US producer of organic yogurt.

Table 4-8 Respondent profile and stakeholders in the ERP-FOOD initiative

Attribute	Description
The respondent position / profile	- The respondent is the company's CIO since 2003. He was hired to restructure the company's IT department and to restart the ERP project that was launched under the previous CIO. He previously worked at Henkel as the VP of IT for a period of 13 years and holds a masters degree in computer science from Columbia University in New York.
The internal stakeholders and sponsors	- A senior business manager was detached from the company's operations to take charge of the ERP project in association with the CIO. - The CIO's decisions had a very strong impact on the company's organizational structure. - The decision-making and the program management were kept internally. - 85 employees were fully allocated to the project (over 150 on average) and 2/3 of them came from the business, the others from IT. The CIO insisted on keeping this ratio to avoid having a technical project instead of a business one. - About 30 people manage the technical architecture and the outsourcing relationship with IBM for operating the company's data center in Montpellier (the infrastructure). - The IS committees created in every business unit and subsidiary ensured an ongoing and very effective communication with the CIO and the central IT function.
The external network (consultants, vendors, etc.)	- The external network mainly consisted of Accenture consultants and SAP people. - Accenture's main role was the flexible staffing of the project. Accenture has the ability to manage the variability of the staff allocated according to the project's needs. - Accenture also provided valuable program management methodologies and extensive experience in the implementation of SAP. - IBM was in charge of implementing and managing the data center / IT infrastructure.

Similarly to the IT initiatives CRM-ENERGY and CRM-POST cases, the ERP project here is the largest transformation initiative the company has ever experienced. The initiative's key characteristics are presented in the following table:

Table 4-9 Key characteristics of the ERP-FOOD initiative (cont'd)

Attribute	Description
Project triggers and strategic motivations	- According to the respondent, the SAP platform is now a highly strategic weapon for the company that drives 85% of its operations in 80 countries. - The complications, inefficiencies and coordination problems caused by a dramatic increase in legacy systems. The numerous acquisitions multiplied the problem. - The need to establish a strong IT governance, to change the company's approach towards outsourcing and to enhance the IT team's quality by including IT in its strategic functions. - Infusing flexibility and increasing efficiency through business integration and control. - The company also aimed at building capabilities for scalability. The goal was to make sure the IT systems were flexible enough to support the growth of its business units.
The system and its major capabilities	- The new ERP system is considered a highly strategic enabler for the company. By standardizing the ERP processes throughout the company's global business units around one single Core Model, the company creates unmatched capabilities for quick change. - The platform creates powerful monitoring capabilities for the company's executives. For instance, the Swiss subsidiary can be monitored from Germany by hosting the Swiss system in Germany and by combining it with the German system. - The system facilitates and systematizes mergers and acquisitions.

Table 4-9 Key characteristics of the ERP-FOOD initiative (cont'd and end)

Major challenges and difficulties	- The major challenge was changing the culture. To transform the business from a culture of decentralization to a culture of standards, processes and productivity. - Before the CIO took over the project, the company had major problems with its IT function, outsourcing relationships and ERP project. According to him, there was a very weak buy-in for the "process" concept inside the company's subsidiaries because the benefits were not communicated proactively. Also, the IT team was not qualified enough for effective governance and management of outsourcing relationships. The internal team was not strong enough to challenge consultants.
The performance and impact on innovation	- The CIO described the project as a "completely radical transformation", the results as "miraculous", the new system as "a strong strategic weapon" and the transformed IT function as "a war machine". - The company is now a reference for Best Practices at SAP because of its ability to build and maintain the strong and unique Core Model and to transform the whole organization. - The measured benefits are extremely satisfying for the CIO and the IT costs over the net revenues decreased considerably after the implementation. - The new system is evolutionary, flexible and scalable while costing less.

The CRM-RESORTS initiative

The company is a French company of high-end vacation resorts found in many parts of the world, usually in exotic locations and seen by many as having started the all-inclusive resort concept. In 2008, the company employed about 20,000 people in 40 countries and sold for over $2 billion of stays in its resorts.

Table 4-10 Respondent profile and stakeholders in the CRM-RESORTS initiative

Attribute	Description
The respondent position / profile	- The respondent was recently appointed CIO of Accor Services, one of Accor's two main divisions, after having successfully implemented the CRM system and mass customization capabilities at the resorts company where he worked as CIO. - He worked as a consultant for Capgemini but he quickly became frustrated with the fact that he could only observe others do the job instead of doing it himself. He regards his CIO role as doing business.
The internal stakeholders and sponsors	- The CIO focused on maintaining the IT competence inside his IT team. - The role of the IT function was to find creative ways to effectively use the CRM tool and to design and maintain powerful business processes that differentiated the company from its competition. The CIO focused on what he calls 'innovation by utilization'. - The sponsor (owner) of the project was the VP of Sales and Marketing and the Human Resources function was actively involved because the project has a serious impact on the jobs of thousands of employees at the company. They were involved in training and change management activities for instance.
The external network (consultants, vendors, etc.)	- Capgemini was the major consultant and system integrator. - Web agencies were hired for the website design and the look and feel, the main one was the Belgian company, Selligent. - The back-end platform and database system was provided by Oracle. - The American marketing company Wunderman was selected for the esthetics and communications side of the project.

This initiative is another business transformation project with a CRM at the core. The company hired Capgemini for the consulting and system integration job, Oracle for the back-end and database system and a number of smaller firms for the front-end (the company's website and e-commerce capabilities) with a Belgium Web Agency called Selligent as the main partner. The project's strategic motivations, innovation outcome and key characteristics are presented in the following table:

Table 4-11 Key characteristics of the CRM-RESORTS initiative

Attribute	Description
Project triggers and strategic motivations	- Shifting from a BtoB to a BtoC sales process through the CRM system with a dynamic and appealing interface to give all consumers the ability to book directly on the company's website or through the company's hotline without needing to contact any travel agency. - The project provided both efficiency gains and a serious increase in growth. - Building a mass customization capability to stimulate demand leading to better marketing campaigns and increased growth.
The system and its major capabilities	- The system is a CRM platform that creates substantial value for both the company's internal and external clients by offering new functionalities and capabilities. - The systems provides powerful mass customization capabilities: (1) it gives the clients the ability to search and find a very large variety of products and packages and to build their own packages on the company's website, and (2) it gives the employees (in call centers for instance) the tools to quickly access information on resorts, to make smart recommendations and to quickly book trips. - The system combines economies of scale with economies of scope by providing a central platform with centralized functionalities used by all the company's outlets around the world while enabling the adaptation of local cells to take the local needs and cultures into account. - The CIO emphasizes the capability to use the system effectively; the way the new business process is utilized. He focused on increasing the company's competitiveness through the optimization and effective usage of the new IT-enabled processes.
Major challenges and difficulties	- The CIO had a hard time finding hybrid people for his project; people who speak both the business and technical language, people with both experience in business and consulting. According to him, the issue is more prevalent in Europe than North America. IT jobs are becoming translation jobs and the IT people need to be hybrid. - The fast rate of technological change was a challenge (technology changes on a 3-years basis) and the CIO created an SOA environment to address this problem. This fact explains the constant need for new IT initiatives to remain competitive. - The CIO found it difficult to keep the project's owners motivated and focused on the project. According to him, the sales and marketing teams are scattered around the world, which multiplied the ownership, accountability and attention problems.
The performance and impact on innovation	- Business innovation for growth and efficiency: The project created new mass customization capabilities enabling the direct distribution of resort stays to consumers, increasing sales, improving the company's brand image and enhancing its customer satisfaction. The project has impacts on both the company's growth and efficiency. - Internally, the CIO used the project to reinforce the concept of "innovating by utilization" to optimize the usage of IT systems. His approach has a positive impact on internal business efficiency, the quality of customer service and the company's sales.

4.3.2 The mixed prototypes in Family 2

This family is characterized by mixed IT initiatives and portfolios of smaller projects that aim at both efficiency and growth simultaneously. The initiatives here affect both standard and evolving business processes and lead to average process, product and market innovations. The three initiatives selected as prototypes here are: (1) BASEL II-BANK, (2) ECM-DEFENSE, and (3) PLM-AEROSPACE1.

The BASEL II-BANK project

The bank is the largest integrated cooperative financial group in Canada, with assets of over $150 billion and revenues of more than $10 billion. It was ranked one of the top financial institutions in Canada with RBC on a debt rating level with a score of AA. The group comprises a network of financial service cooperatives (caisses and credit unions), and some twenty subsidiaries in life and general insurance, securities brokerage, venture capital and asset management[19]. The group aspires to expand in new pan-Canadian and international markets.

However, its weaknesses in risk management practices could block and harm the bank's expansion plans. When the Basel II legislation came out, it quickly observed a serious gap in its risk management capabilities and decided to launch an IT initiative to integrate the necessary tools and processes in order to obtain the certification. The budget was first estimated at $130 million.

[19] Most of the cooperative's service outlets are in Quebec and Ontario but it has recently opened new ones in other Canadian provinces and in Florida where a large community of Quebecers resides.

Table 4-12 Respondent profile and stakeholders in the BASEL II-BANK initiative

Attribute	Description
The respondent position / profile	- The respondent is a high profile consultant and project manager in IT. - She was hired by the bank to take over, restructure and manage the Basel II program that was showing poor results. - Her official title is "Directrice, Portefeuille de Projets, Gestion des Risques". - She replaced most of the management team when she took over the project.
The internal stakeholders and sponsors	- The IT function (of 2,000 employees) had a smaller stake in the project before the arrival of the respondent. The project management team underestimated the importance of the IT function's role in the project and according to her the behavior was one of the major reasons for the project's initial poor performance. - The project was aligned with the bank's IT vision and architecture and the IT function was given a more important and strategic role in the project. - About 40% of the initiatives were decentralized and given to business units. The respondent transferred the accountability of almost half the portfolio to business unit managers. This decision had a very positive impact on the delivery process.
The external network (consultants, vendors, etc.)	- Price Waterhouse Coopers (PWC) was commissioned in 2003 to help the bank define its needs and determine what new capabilities the bank had to build to conform to Basel II (before the respondent was hired). PWC came up with a portfolio of initiatives estimated at $72 million but according to her, the envelope was not really clear and precise and she had to re-evaluate the project when she started. - The bank decided not to work with IT consulting companies and refused to use the services of companies like Accenture, IBM and Capgemini. - The bank opted to hire individual consultants instead of consulting companies. About 60% of the project team was composed of individual consultants and the remaining 40% of employees. The respondent is also a consultant. - The major vendors for credit risks and rating systems in the project are companies like Moody's, Experience and Fairisaac. These vendors offer consulting services and critical credit information with their applications. According to the respondent, the content they provide in their applications is more important than the application itself. - For the market risks component, the bank chose a mix of commercial and homemade applications. Companies like Algorithmics and Sungard provided the commercial applications. - No stable and mature commercial applications were found for operational risks so the bank opted for homemade solutions in this category. The commercial applications were all in their beta test phase.

At first, the bank saw Basel II as a legal obligation to enter new markets and did not see the project as a strategic and urgent opportunity that could have a serious and positive impact on business innovation, growth and competitiveness. When the project started, the cooperative managed Basel II as a heavy administrative load and a long legal procedure. The banking initiative's strategic motivations, innovation outcome and key characteristics are presented in the table below:

Table 4-13 Strategic motivations and performance in the BASEL II-BANK initiative

Attribute	Description
Project triggers and strategic motivations	- The project was triggered by the bank's aspirations to build global best practices and capabilities in risk management and to use the requirements of Basel II as motivations - The group needed the certification for pan-Canadian and international recognition and the cooperative could not compete outside Quebec and penetrate new markets without this recognition and the risk management capabilities in place. - These risk management capabilities are IT intensive and the bank had the option to either buy commercial software packages or build its own applications.
The system and its major capabilities	- The risk management system is a mix of several commercial and homemade applications. - The Basel II system consists of 4 domains and capabilities: (1) credit risks, (2) market risks, (3) operational risks (fraud, security, IT security, etc.), and (4) the integrated risk management capability (Business Intelligence) for corporate governance. - The respondent compares Basel II for finance to ISO for manufacturing. - For the credit risks capabilities, the bank bought commercial tools from vendors like Moody's, Experience and Fairisaac. Most of the other tools were developed in-house.
Major challenges and difficulties	- The major challenge was to get the business units to clearly define their requirements in risk management processes. The initial poor definitions led the bank to make bad choices of commercial applications. The respondent had to start by getting business managers to clarify and write down their precise needs. - Another major challenge was to sell the project internally and to build a vision for employees to see it as an opportunity to develop best practices and capabilities that would enable the bank to penetrate pan-Canadian and international markets. - Transferring the accountability to business unit managers was difficult. - The initiatives had to be restructured and decomposed in smaller independent modules and relationships with unwanted vendors and suppliers had to be broken. - The respondent had to replace a large number of people already recruited for the program. - The instability of a large number of vendors due to constant acquisitions and change of their application roadmaps had to be addressed. - The bank had a hard time finding a commercial tool in operational risks and the company thought it could quickly ramp-up its internal capabilities in operational risks by integrating a good application and learning to use it effectively. This was unfortunately not the case because the commercial solutions were all in their beta test phases and were too risky and unstable for the bank. - The difficulty to retain good consultants who get better offers by competing banks implementing Basel II like Banque Nationale.
The performance and impact on innovation	- According to the respondent, the Basel II program had a very bad visibility when she started but now the bank is considered a reference in the industry by Gartner and the like. The group moved very fast from the lowest ranks to the highest ranks. - Business process innovation: the bank already had the credit risks capability and business processes required by Basel II (even though it lacked the efficiency of commercial applications) but it lacked the capabilities and processes in the other 3 domains (market risks, operational risks and business intelligence). To build these new capabilities it had to innovate in its business processes. - The bank had one of the best long-term debt ratings in Canada with the Royal Bank; both were rated AA at that time.

In its first year, the project did not perform well because of the way it was managed and because it was not understood and accepted internally. The bank's management decided to freeze the program and quickly found someone more competent to manage it. When the respondent was brought in, she reversed the equation and forced the bank to look at the project as an opportunity to build new risk management capabilities that would enable the bank to compete on international markets, instead of looking at it as a heavy regulation.

The respondent reconnected the project with the bank's corporate strategy and was able to sell it internally and to mobilize all stakeholders for change. The Basel II requirements are a set of mathematical models and algorithms that need to be supported by software and connected to business processes. The legislation was the result of 952 articles written by international experts. The bank had the option to either buy commercial software packages or develop its own customized tools.

The ECM-DEFENSE initiative

The company is the world's leading contractor of defense large-scale software systems and the Pentagon's largest foreign supplier. It also operates in aerospace, space, security and transportation markets. The global company employs over 68,000 people from whom 25,000 are high-level scientists and engineers. It operates in 50 countries and 80% of its revenues are generated outside of France[20].

This strategic IT initiative is a large-scale and company wide implementation of a new centralized collaboration and personal productivity platform used by the company's large and numerous project teams. The owners and board members demanded to transform the company from a decentralized project-based organization to a centralized organization through IT-driven initiatives. The collaboration and project management platform studied here is the largest and most innovative of these recent transformation projects.

[20] The company is public. 27% of the shares of the company are owned by the French State, 26% by Dassault Aviation and 47% are free float shares (from which 3% are owned by employees).

The company's operations are project-based; large and complex technology projects where a large number of internal and external stakeholders need to collaborate.

Table 4-14 Respondent profile and stakeholders in the ECM-DEFENSE initiative

Attribute	Description
The respondent position / profile	- The respondent is the group's Information Systems VP or CIO. - He reports to the group's SVP of operations.
The internal stakeholders and sponsors	- According to the respondent, in software projects, the involvement of business managers is critical. This is not the case in hardware projects. Obtaining a formal and clear commitment from business managers is also critical. - All the six business units were involved in the project. - Both the executive committee and the IT function were in charge of the front-end study costs of the project. The implementation costs were allocated to the six business units according to head count. - The executive committee (hierarchy) accepted the project and appointed the business managers who had to work on the project. The CIO was challenged by the operations committee to reduce the exploitation costs of the messaging function and the business case had to be reviewed. This had an implication for all the six business units. - The CIO's project team is composed of 30 people organized over the 3 project functions: (1) messaging, (2) web-conferencing, and (3) ECM and Action Items. The IT team evaluates and compares commercial solutions using scoring tables and an objective measuring method. The role of the IT function has become strategic: IT governance, project management (steering) and managing contracts and outsourcing relationships. It is also not involved in production activities.
The external network (consultants, vendors, etc.)	- In general, the group has a policy of hiring a small number of strategy consultants for its IT projects. Only four external individual consultants were hired, a senior consultant and project manager and three consultants in charge of training through workshops. - The company's services unit, the group's own IT services providers, was selected for the project as the IT consultant and outsourcing partner for the new applications. IBM Global Services was competing with this business unit in the bid. - The RFI was critical in the vendor selection process because it helped the company gather detailed information on the functionalities and capabilities of the available systems in the market and it enabled the formulation of better RFPs.

According to the respondent, the group's CIO interviewed for the current study, every project generates thousands of "actions" that were not configured and managed on one single platform using one single database system and this reduced the performance of project teams as they were growing and spreading around the world. Additionally, project managers were not using indicators to constantly monitor actions in projects and for instance had a really hard time identifying late actions, open actions, etc.

The ECM initiative's strategic motivations, innovation outcome and key characteristics are presented in the following table:

Table 4-15 Key characteristics of the ECM-DEFENSE initiative

Attribute	Description
Project triggers and strategic motivations	- The first goal was to use IT-driven transformation projects to integrate and centralize the group and to enhance collaboration and communication within project teams. - The thousands of actions generated by the various stakeholders (clients, suppliers, etc.) in every project were not coordinated and centralized on one single platform. - Increase the professionalism of the methodologies used to respond to requests for proposals and increase the quality of proposals presented to clients. - Enhance the managers' ability to make strategic decisions by establishing real time indicators based on the status of all actions generated for the projects. - The project was intended to increase the satisfaction of employees (internal clients) especially the young and technology savvy ones and in turn to reduce attrition rates. - Replace the existing legacy systems in messaging, web-conferencing, and content management. The major content management system in place (Quick Place) was not a full ECM platform.
The system and its major capabilities	- The system is a collaboration and project management platform that enables large project teams around the world to collaborate and communicate effectively and efficiently. - The new platform is intended to rejuvenate the company's collaboration capabilities by developing the following 3 major functionalities: (1) messaging (including managing agendas and contacts of every person), (2) web-conferencing (including group chatting and eventually videoconferencing), and (3) Enterprise Content Management (ECM) including Action Items. The documents portion of the third functionality was split in two major categories: (1) functions and (2) projects. In the first category, members of the same function (HR for instance) would share confidential documents with security settings blocking the access to members of other functions and in the second category, documents are shared in a transversal way and access is limited to project members. - The flexibility in security settings is a key capability in the new platform.
Major challenges and difficulties	- The major challenge was to get the buy-in and acceptance from all six business units and functions affected and especially to get them to accept the additional short-term costs and to see the benefits and performance gains on the long-term. - The business case had to be reformulated several times according to the feedback received from business managers. The feedback process was longer than expected. - The constant negotiation between the IT team and the business managers to agree over the quality-price ratio of the new applications. - Comparing and rating all software packages objectively and managing the relationship with vendors during the selection process to make the best choices.
The performance and impact on innovation	- The system provided strong collaboration, coordination and networking capabilities that the company needed urgently with the increase of the size and complexity of its technology projects. It also enables the group to capitalize on knowledge that is distributed throughout the company's business units. - The initiative had a positive effect on the sales process and in turn on the company's revenues and margins. The system enhanced the professionalism and quality of the process of responding to RFPs. - The system will provide strong governance capabilities by channeling key project indicators to the company's senior management. Indicators related to all action items in all projects on a regular and real-time basis.

The absence of real time information on the performance and evolution of project actions reduced the managers' ability to make sound and rational decisions. These problems triggered the $100 million IT initiative described here. The initiative was highly strategic and had a serious impact on the work of all employees at the defense company, especially the 25,000 high-level scientists and engineers who work on large technology projects. According to the CIO, one of the major strategic issues in the project was getting the buy-in of people in the company's six business units and six major locations; a matrix of 36 units to address differently.

The PLM-AEROSPACE1 initiative

The company is a world leader in the aircraft engine industry and one of the big-three players. Based in Montreal, the company is a division of a large technology group. The division in this study employs about 10,000 people and generates over $10 billion in revenues and $2 billion in profits. It is headquartered in Montreal for its position as a major hub in the global aerospace industry[21].

Table 4-16 Respondent profile and stakeholders in the PLM-AEROSPACE1 initiative

Attribute	Description
The respondent position / profile	- Three key persons were interviewed simultaneously for this project: o The manager of the engineering systems and the PLM group o The principal consultant for the graphic and data systems o The head of the education and training function
The internal stakeholders and sponsors	- The engineering function and its PLM group are the project sponsors. - The company's executives are not involved enough according to one of the respondents. - The low involvement of senior managers and engineers is due to the company's boom in sales orders and the difficulty to get the attention of these managers and engineers away from the production of engines. - The HR function is actively involved because of the new competences needed to integrate and operate the new system.
The external network (consultants, vendors, etc.)	- IBM and Dassault Systèmes are the two major external stakeholders in the project. - Bombardier (the largest customer) is a major external player. The company built the project around Bombardier's systems integration requirements. - Dassault Systèmes was chosen for the PLM platform first because Bombardier had already selected the vendor and second because Dassault Systèmes has a very powerful PLM vision and leadership position that the others don't have. The company can benefit from innovative modules (functionalities) that Dassault Systèmes would be willing to develop for free in exchange for the right to sell it to competitors.

[21] Industry players like Bombardier, CAE and Bell Helicopter, and regulators like the International Civil Aviation Organization (ICAO), the Canadian Space Agency and the International Air Transport Association (IATA) are also located in Montreal.

In addition to aircraft engines, the company produces gas turbines, marine turbines and rocket engines. It addresses both the civil and military markets. The company decided to enhance the performance of its engineering and manufacturing functions by upgrading its CAD/CAM system to a full-fledged PLM platform that would greatly improve the capability of engineering teams to collaborate on new product development projects. The project will not only enable the synchronization of engineering work inside the company, it will integrate the company's engine development cycle with the aircraft development cycle of its major customer, Bombardier.

The PLM initiative's key characteristics are presented in the following table:

Table 4-17 Key characteristics of the PLM-AEROSPACE1 initiative (cont'd)

Attribute	Description
Project triggers and strategic motivations	- The first trigger was to migrate from a product centric CAD environment to a collaborative and process centric PLM environment where the product development process is managed hand-to-hand on one single platform. - The capability to create virtual models or prototypes of new products and to reduce the time needed to test the physical prototypes and to get the new models out on the market. - The company needed to control and share the configuration of data and product definitions. - To give engineering teams the capability to iterate designs and to explore more and quicker. - Replacing most of the current homemade PLM system and its several legacy problems with a single integrated PLM solution. Only the portion of the PLM process that gives it a strong competitive edge will be kept internally and the rest substituted by the commercial solution. - The capability to collaborate and share new designs globally on one single platform. - The need to integrate the company's product development system in the system of Bombardier, its major customer. Bombardier is pushing its supplier to fully integrate in its own PLM platform. The company is becoming an extension of Bombardier's aircraft development process and all its engines will be developed in a digital mockup environment.
The system and its major capabilities	- The Product Lifecycle Management system enables the following: (1) management and control of product definitions and data configurations, (2) the collaboration of large and global development teams on a single platform, (3) the rapid creation of virtual prototypes to reduce the time and cost of the overall development cycle, (4) the effective and efficient management of development processes through the flawless synchronization of all modules (functions) needed (as opposed to the inefficiencies that result from stitching legacy systems), and (5) the tight integration of the engine development cycle in the broader aircraft development cycle for a faster and more effective co-evolution process.
Major challenges and difficulties	- Obtaining the buy-in of key managers and engineers was a major issue. The reason for the weak internal buy-in according to one of the respondents is first (1) the lack of money and investment in the project because of the urgent needs of money in manufacturing to quickly respond to growing orders of engines, the project is not the first priority for the company's senior management, and second (2) the constant distraction of the key managers and engineers who were appointed on a part-time basis. - Managing the evolutionary process is another major challenge according to Warren Hall; the need to constantly integrate external breakthroughs and advancements while influencing the software vendors and incite them to innovate through collaborative and trust relationships.

Table 4-17 Key characteristics of the PLM-AEROSPACE1 initiative (cont'd and end)

	- According to Nick Spathis and Warren Hall the project performed quite well but the learning curve was major with the V5 PLM release. - The problem is that not all senior managers have seen the benefits. The benefits were clearly seen on the silo levels but not on the executive committee level. - The project created a capability to build virtual models (prototypes) of all new engines and resolve all problems before building the physical models. The time needed to come up with a simulation was brought down to 5 minutes from 30 minutes. - The number of engine development projects that the company can run in parallel has greatly increased. It is now capable of managing 22 engine projects simultaneously as opposed to 6 projects 10 years ago. This is also due to the system's powerful collaboration capabilities. The PLM system enables effective collaboration with clients and suppliers.
The performance and impact on innovation	- The company stimulated innovation by asking for functionalities that the commercial package did not contain. Some of the specific functionalities were charged while the general functionalities that Dassault Systèmes could sell to its other clients were developed for free. The company influences Dassault Système's roadmap.

After all, the engine is only a component in a more complex assembly and the two companies need to align their information systems in order to innovate and evolve together. Whether the technological breakthroughs originate in the engine (component) or in the aircraft (assembly), a close collaboration is critical for the innovation process to be rapid and effective.

4.3.3 The growth-oriented prototypes in Family 3

The prototypes selected in Family 3 are: (1) PLM-ENERGY, (2) DDS-THEME PARK, and (3) MC-OPTIC. This growth-oriented family is characterized by new and evolving IT platforms like PLM and EHR systems that are implemented in highly dynamic domains of the organizations. The initiatives here lead to the three types of innovations simultaneously and more importantly have strong effects on product and market innovations. These initiatives lead to breakthroughs in IT systems that in turn create new markets for IT platforms and modules. The IT initiatives in Family 3 are much smaller in size and affect smaller numbers of employees.

The PLM-ENERGY initiative

The utility partnered with IBM and Dassault Systèmes to build an innovative PLM platform designed for the hydroelectric construction industry. As previously seen in the CRM-ENERGY project, the company is divided in four major units: (1) Production, (2) Transport, (3) Distribution and (4) Services (Équipment / SEBJ). The PLM project was sponsored and managed

by the Équipment / SEBJ division. The division is in charge of managing the company's large engineering and construction projects. SEBJ stands for Société d'Énergie de la Baie James.

The strategy of IBM and Dassault Systèmes was to partner with the utility (the owner of key industrial knowledge) to penetrate the global construction industry with innovative PLM solutions.[22] The complex PLM solution developed with the utility would eventually be scaled-down and adapted to other industries and markets.

Additionally, IBM sold the ALM (Asset Lifecycle Management) concept to the company. The ALM system is an extension of the PLM system and enables the long-term maintenance of the hydroelectric construction and eventually its decommissioning.[23] The ALM market in the hydroelectric or nuclear sectors is very attractive as opposed to the ALM market in the automobile sector where the production line for a car model has an average lifecycle of 5 years.

The project is the first of its kind and an excellent example of the active role of expert customers (lead users or early adopters) in the software innovation process. The project is an IBM FOAK (First of a Kind) project.[24]

IBM and Dassault Systèmes signed an agreement with the utility (considered a leading-edge utility) to solve a commercially critical and complex problem. In exchange for the key knowledge that the utility and SNC Lavalin possess on large hydroelectric projects, IBM offered to build and integrate the new platform for a very low fee and to share the revenues generated by the sales of the solution to other utilities and energy companies on the global market.

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[22] Their goal was to create and lead the PLM market in the major industrial construction markets like the nuclear, petroleum and hydroelectric markets.

[23] The ALM system is particularly attractive when the lifecycle of an asset is long like the 50 to 100 years lifecycle of a hydroelectric complex.

[24] The IBM FOAK strategy is a major open innovation mechanism created by IBM after a major restructuring initiative in the 1990s when the company decided to shift from a closed product centric logic to an open customer centric logic.

Table 4-18 Respondent profile and stakeholders in the PLM-ENERGY initiative

Attribute	Description
The respondent's position / profile	- The respondent was the account manager at IBM for the PLM project at the utility. He was in charge of the project since it began and was in an ongoing relationship with the managers and engineers at the utility and SNC Lavalin. - He has over 25 years of experience in the CAD/CAM and PLM industry. - He joined IBM in early 2001 and was appointed to the PLM-ENERGY project a few months later. He also has experience with other major CAD/CAM platforms like AutoCAD (Autodesk) and Unigraphics (UGS / Siemens).
The internal stakeholders and sponsors	- The division responsible for the project is the Équipement / SEBJ division in charge of managing the company's large engineering and construction projects. - The head of the division, Mr. Serge Lapalme, was the project's real sponsor. - A new structure was created in the Équipement / SEBJ division under Mr. Lapalme to support and govern the PLM project. The structure was also connected to the IT function with various new mechanisms intended to involve the function. - According to the respondent, SNC Lavalin was playing the real business role in the project from the moment it started. The company is the sponsor but SNC Lavalin is the real business partner in the project with the engineering expertise and knowledge. - Senior managers at the utility, IBM and Dassault Systèmes were involved.
The external network (consultants, vendors, etc.)	- IBM and Dassault Systèmes were the major partners. The project was so strategic for both companies that the CEO of Dassault Systèmes, Mr. Bernard Charlez, the president of IBM Canada, and other senior managers traveled from France and the USA to meet with the utility's senior management. - SNC Lavalin was playing the customer role and brought the business knowledge and expertise in the project. - IBM and Dassault Systèmes combined knowledge and expertise from several business units and divisions to come up with an innovative solution and powerful prototype.

The PLM project's strategic motivations, impacts on innovation and key characteristics are presented in the following table:

Table 4-19 Key characteristics of the PLM-ENERGY initiative (cont'd)

Attribute	Description
Project triggers and strategic motivations	- The partnership idea for creating the PLM for the hydroelectric construction industry was initiated by IBM. IBM's strategy is to enter the large industrial construction market (hydroelectric complexes, nuclear generators, petroleum platforms, etc.) - The utility's initial intention was to migrate from a 2D design environment to a 3D environment. The company was also trying to push its engineering partners to digitize their business processes and to collaborate on a single shared platform. - IBM's bold proposal was aligned with the utility's vision and aspirations. - IBM sold the idea of eventually running an ALM (Asset Lifecycle Management) system, an extension of the PLM, which was described as the beginning of a long-term collaboration. - The goal of synchronizing the processes of all suppliers (engineering consultants) with the utility's processes is to increase efficiency and to minimize errors and rework. - The new platform also reduced the costs of hydroelectric projects in a significant way.

Table 4-19 Key characteristics of the PLM-ENERGY initiative (cont'd and end)

The system and its major capabilities	- The PLM system is an engineering design and collaboration tool that enables internal teams to work effectively and efficiently with external teams (mainly suppliers). - The PLM platform chosen here is the Dassault Systèmes solution that comprises major modules like CATIA, ENOVIA and Smarteam. - The project was used to adapt the standard Dassault modules to the hydroelectric construction domain creating a complete new market. - The system gives the company the capability to iterate virtual models and prototypes of hydroelectric constructions and in turn to reduce the time, cost and errors normally addressed is such large engineering projects. It also enables the company to manage and control the complete lifecycle of its hydroelectric complexes during both the construction and operation phases. The ALM component of the platform is particularly important for the utility since the operational lifecycle of a damn varies from 50 to 100 years. The system gives the company more control over its projects, assets and information.
Major challenges and difficulties	- The major challenge was to get the company's major suppliers and engineering partners (SNC-Lavalin, Tecsult, etc.) to accept and adopt the new system. The system reduced the consultants' control over the project information on one side and increased the utility's control on the other. - According to the respondent, the challenge was more a political challenge. Understanding the complex web of strategic and political relationships inside the utility and between the utility and its large partners like SNC Lavalin was the hard task. - The political challenge was paired with the intellectual property (IP) and information control issues. Reaching a clear agreement over knowledge / IP ownership and sharing was a very tough problem. - The IT function was reluctant to participate in the beginning but Mr. Serge Lapalme insisted on getting them actively involved. Mr. Lapalme created strong connections between his division and the IT function through the small structure that was built right below him for governing the PLM project.
The performance and impact on innovation	- The new PLM system for hydroelectric construction was successfully built through the sustained efforts of the utility, IBM, Dassault Systèmes and SNC Lavalin. IBM used its global industrial IT knowledge and expertise in other industries like shipbuilding and combined it to the Dassault PLM platform to develop the new system. - The company's Equipment division was very impressed with the new platform according to the respondent. The system functions really well and is very user friendly. - The utility became a reference customer for IBM and Dassault Systèmes and together the companies started to sell the new platform internationally. The ROI for the utility (a reference client) was very high and the project had a strong and positive impact on the company's growth and profitability.

The DDS-THEME PARK initiative

The Paris based theme park is the largest tour operator in Europe located near Paris. In 2008, the park received over 15 million guests and France received about 80 million visitors. France is the most popular destination on the planet, the USA being the second most popular with almost 60 million visitors, and the theme park in question one of its major attractions. The business operates two leisure parks, 6000 hotel rooms at a capacity of about 89%, and many convention

centers. The park is a French public company of which its mother company in the US holds 40% of the shares, the Saudi Prince Alwaleed about 10% and smaller shareholders hold the rest (including CRM-RESORTS).

Table 4-20 Respondent profile and stakeholders in the DDS-THEME PARK initiative

Attribute	Description
The respondent position / profile	- The respondent is the CIO of the company. - He is a leader and intrapreneur; he manages several innovative projects in parallel with an IT team of over 200 individuals. His leadership skills gave him a key position on the theme park's executive committee. - Before joining the park in year 2000, he worked for six years for Reebok and another six years as a consultant with Accenture. Thanks to his experience at Accenture he gained strong methodology skills and thanks to his experience at Reebok he learned a lot on international cultures.
The internal stakeholders and sponsors	- The two key functions involved in the project are the IT function and the Sales and Marketing function. The CIO and the VP of Sales and Marketing are both leading the project but the project sponsor is the Sales and Marketing department. - The CIO and his team worked hard to stimulate an internal demand for the DDS capabilities. This is a major success factor for the project. Business managers were actively involved and made the right decisions with regards to the scope of the project, the functionalities of the system and the overall business processes. - The CIO managed his relationships with the business in a business-technology partnership mode not in an IT Delivery mode. The relationship gives the CIO the right to veto or select requests and even to guide business managers in their choices.
The external network (consultants, vendors, etc.)	- Accenture is the major consultant and partner in the project. More precisely, Accenture's Travel Distribution Services division was in charge. - The CIO picked consultants at Accenture by their names. These consultants know the company, the industry and the technology extremely well. - The respondent uses external IT networks like the CIGREF (Club Informatique des Grandes Entreprises Françaises) to get ideas, benchmarks and feedback from other high profile CIO's in leading French companies in all industries. He also initiates and participates in exchange groups with key players in the travel industry. - Navitaire, an application service provider and wholly owned subsidiary of Accenture that specializes in the travel industry, was brought in for hosting services and transactional BPO capabilities. - 80% of the project staff was external (mainly form Accenture and Navitaire)

The current case was conducted on the major IT project supporting the company's IT roadmap and business strategy. The following were the company's major business objectives in 2007-2008: (1) visitors' satisfaction, (2) optimization of human resource allocation, and (3) increasing revenues and profit margins in core businesses.

The DDS project's strategic motivations, impacts on innovation and key characteristics are presented in the following table:

Table 4-21 Key characteristics of the DDS-THEME PARK initiative

Attribute	Description
Project triggers and strategic motivations	- The DDS initiative aimed at increasing both revenues and profits in core businesses. The project directly supported the company's strategic objectives. - It aimed at: (1) increasing profits by reducing the average costs of sales and distribution processes mainly by shifting from BtoB sales processes to BtoC sales processes, (2) increasing revenues by offering online customers the right products and the possibility to customize them, and (3) a better customer relationship and brand image.
The system and its major capabilities	- The DDS system developed in partnership with Accenture is the first of its kind in the tour operating business. The system creates a powerful mass customization capability enabling online customers to customize and book their holiday packages directly on the theme park's website. The system optimizes the current capacity at the resort. - The following key capabilities are embedded in the system: Filtered Offering, Dynamic Pricing, Revenue Management and Yield Management. In Filtered Offering, product configurations are preselected according to customers' preferences and the customers feel like products are being completely customized for them.
Major challenges and difficulties	- Change management was limited to the company's help desk where the task of operators changed from simply taking orders to being proactive sales people. The operators had to be trained to use the new DDS system and to change their attitude to start recommending products and up-selling. - Managing the relationship with travel agencies who traditionally distributed the theme park's products and who suddenly became competitors and non-essential partners. - The company had to integrate the new DDS system with critical legacy systems. - The refusal of some of the business innovations was a difficult task for the CIO but the selection process was critical for the overall performance of the DDS platform.
The performance and impact on innovation	- The new DDS system helped the park become independent from travel agents and tour operators and to regain control over its customer relationship, profit margins and brand image. - The DDS system is the first of its kind in the tour operating market and the partnership between Accenture and the park allows Accenture to commercialize the new tool around the world in exchange for profit sharing. The system enhanced the company's competitiveness by giving their online customers the possibility to customize their own trips. - The system increased the company's revenues by facilitating the right product packages at the right pricing. It also increased the company's margins by reducing the costs of sales and distribution processes by shifting from BtoB to BtoC channels. - The project was delivered with minor delays and costs overruns of less than 5%. - The company's call center was transformed from a reactive order taker to a proactive sales team having a positive impact on growth. - Organizational innovation: according to the CIO, the organization of the project was very innovative. Organizational innovations comprised (1) the modularization of the project, (2) the quick knowledge transfer at the mother company in Florida and California, (3) the off-shore development, (4) the software as service, ASP or on-demand contract, (5) the reimbursement of project costs through a joint venture, and (6) the innovative architecture with an EAI in the middle.

The IT project supports the third business objective and is intended to provide the following major strategic benefits: (1) increasing profits by reducing the average cost of reservation (sales) and shifting from BtoB distribution processes to BtoC processes, and (2) increasing revenue by optimizing yield and revenue management.

The project consisted of developing and implementing a mass customization system called Dynamic Distribution System (DDS) in partnership with Accenture. The system was inspired by the self-packaging systems pioneered by Dell. The first name the company gave the system was Virtual Self Packager. Accenture and the park created a joint venture to commercialize an innovative DDS solution for the tour operating market in the way IBM and the Quebec utility partnered to commercialize an innovative PLM solution for the hydroelectric construction market. The project lasted for just over 2 years and reached a budget of about $25 million.

The MC-OPTIC initiative

The company is the world's leader in ophthalmic lenses with a turnover of over $5 billion and over 35,000 employees in 100 countries. Headquartered in Paris, the company is the leading manufacturer and distributor of optical lenses in the world including the United States and Canada. In Canada, it leads by far and owns the largest share of the Canadian market.

It specializes in ophthalmic lens production, manufacturing and distribution in addition to wholesale optical laboratory operations. The company has made innovation a top priority and invests 5% of its revenues in R&D. It is a leading researcher in cutting edge science and inventor in areas like optics, digital surfacing and materials and coatings.[25] It employs 550 researchers throughout 5 major research centers in France, USA, Singapore and Japan.[26] The company believes in open and collaborative innovation and it relies extensively on networks of universities, industrial groups and innovative SMEs. Here are some of key innovation metrics that demonstrate the company's innovation capability (obtained from the company's website):

- 50 % of the income is generated by products launched less than 5 years ago

[25] The company owns 590 patent families and more than 4200 patents.
[26] The center in Japan is a joint venture with Nikon.

- 30 % of the income is generated by products launched less than 3 years ago
- 75 new products were developed in 2007
- In the space of just a few years: the number of new products launched has seen a threefold increase and manufacturing lead times have been halved

Today, the manufacturer is leading the digitization of the end-to-end process from measurement to production in optic lens production. The company operates 16 factories and more than 300 proximity labs around the world.

Table 4-22 Respondent profile and stakeholders in the MC-OPTIC initiative

Attribute	Description
The respondent position / profile	- The respondent is the company's CIO. - He is also the president of the CIGREF (Club Informatique des Grandes Entreprises Françaises), the top IT association in France and one of the most prestigious in the world. - He is involved in his firm's strategic process and has a key role in its executive committee. - His knowledge of the company's products, markets, competitors, R&D activities and business processes is exceptional. It exceeds the traditional boundaries of an IT function.
The internal stakeholders and sponsors	- A new business unit called 'système de calcul optique' was created and the head of the unit is the owner of the project. The business unit was recently created and yet already accounts for about 2% of the company's revenues. - The project sponsor is the corporate committee (it is a corporate project). It is in charge of funding the project and launching the business unit. No other business unit is affected. - Before the new business unit began to sell the application to external labs (that also compete with the company's proximity labs), the company started integrating the new system in its own proximity labs. The system was developed, tested and stabilized internally before it was commercialized. - The head of the new unit and sponsor of the project is the former head of operations for company's proximity labs in France. - The R&D function had to work closely with the project team to integrate the new algorithms in the software tool. Around 50% of the project's costs are internal and the other 50% external.
The external network (consultants, vendors, etc.)	- The Boston Consulting Group (BCG) was hired for strategy and organization consulting. The company helped the company with the project's strategic plan. - Experts were hired to conduct specialized tasks like INRIA (Institut National de Recherche en Informatique et Automatique). INRIA provided specialists in the optimization of complex algorithms. - The development / programming work was outsourced to specialized IT service providers like Mantri in Bangalore, India. - In comparison to the other system development projects, the company did not partner with an IT consulting firm or a vendor because of the thinness of the market for lens design applications as opposed to the markets for construction PLM platforms or EHR applications.

Competitive threats, radical innovations in digital surfacing machines (lens finishing), and the company's desire to innovate, grow and maintain a leadership position in the industry, triggered an ambitious and innovative IT project. The project's objective was to develop and commercialize a software tool for the design and mass customization of optic lenses and the creation of a separate business unit. The initiative supports the company's strategic objective: to build powerful and integrated IT systems and to vertically integrate to drive the mass customization of optic lenses and to create a new market for optic lens calculation systems. In 2008, the new market created by the company's new business unit accounted for more than 2% of the company's revenues (about $100 million). The MC-OPTIC initiative's key characteristics are presented in the table below:

Table 4-23 Key characteristics of the MC-OPTIC initiative (cont'd)

Attribute	Description
Project triggers and strategic motivations	- The project answers a large variety of strategic objectives. - Address the serious paradigm shifts in the industry with the advent of the innovative digital surfacing machines. The machines (produced mainly by German and Japanese firms) are easily integrated in laboratories for lens orders and finishing. The disruptive innovation is a serious threat because it could force the company down the lower levels of the value chain. Additionally, large distributors like Wal-Mart entered the market by integrating small optic labs and operating the new surfacing machines. The company was pressured to address these industrial shifts and threats. - Build the company's mass customization capability by digitizing and automating the end-to-end process from laboratory orders to production and distribution. The capability enhances the quality of lenses and reduces their production and distribution costs. - Create a new business unit to commercialize for the first time in history a system for optic lens design (the Google of optic lens calculation) and increase the company's revenues, control over distribution channels, brand image and competitiveness. - Block disruptive competitors who threaten the company with similar applications. - Turn competitors (external labs) into clients (by providing their lens design systems).
The system and its major capabilities	- The system if the first of its kind, the optic lens calculation system or the Google of optic lens calculation. It enables opticians in their labs to order the right semi-finished lenses automatically then it operates the digital surfacing machines for the finishing process. - The system is at the core of the company's mass customization capability and it's synchronized with the company's SCM and manufacturing systems. The system contains the company's proprietary IP on lens design and sight correction, methodologies, algorithms and technologies (generated by its R&D function including the input of external university laboratories).

Table 4-23 Key characteristics of the MC-OPTIC initiative (cont'd and end)

Major challenges and difficulties	- The strategic front-end episode was the most difficult because the consensus over the new business model and IT architecture was hard to attain. - Senior managers were not agreeing on the project's objective: blocking competition or proactively building a new business unit. - Estimating the project's budget and timeline was one of the major challenges. This was due to the high market and technology uncertainties. - The smaller disruptive competitors were a threat to the system's commercialization. - The turbulence of the market especially in the USA and the emergence of large chains like Wal-Mart who can make decisions that dramatically affect the company. Predicting and influencing the decisions of these large chains is a major challenge for the company. - The difficulty to get buy-in from the various business units for the project and the challenge to create incentives in the business units. Business managers are afraid to destabilize their operations in favor of a project for an untested business model. - The complexity is too high to rely on rational methods according to Mr. Lambert and only faith and strong commitment could work. - Even though the company tried to normalize the platform as much as possible using standards like XML, the implementation with external clients is difficult because their information systems and processes are very heterogeneous. - Providing high levels of security and business continuity to external clients. This is a major business model change because the company becomes responsible for ensuring the process continuity and the flawless operation of its clients' platform. Important crisis prevention and support mechanisms need to be implemented.
The performance and impact on innovation	- The project has a very strong and positive impact on innovation and strategic renewal. - The IT initiative turned into an independent business unit that creates value and generates profits. The project created the market for lens calculation IT systems. - The company's mass customization capability was dramatically enhanced. - Mr. Lambert is very satisfied. According to him, the project's objectives were reached: (1) block competitors, and (2) prove to external labs (the clients) that the company was able to provide the high quality service and system. - Mr. Lambert qualifies the new system as a radical innovation.

The project is at the core of these strategic IT and mass customization objectives. The respondent interviewed is the company's CIO.[27] His intention with the project was to build the "Google of optic lens calculations".

According to the respondent, more and more lens orders are electronically connected but the level of digitization highly differs from country to country. In Japan, 92% of lens orders are electronic while only 65% in Germany and less than 40% in Canada and the US.

[27] The CIO is a passionate and entrepreneurial CIO who also leads the CIGREF (Club Informatique des Grandes Entreprises Françaises), the top IT association in France and one of the most prestigious in the world.

The company produced more than 220 million lenses in 2008 from which 50 million were finished on digital surfacing machines using the company's new lens design software. These 50 million lenses were still semi-finished in the company's factories before the digital surfacing process. The other 170 million were totally produced in its factories with the traditional process.[28]

[28] Simple lenses for myopia for instance are still cheaper and easier to produce with the traditional injection process using molds.

CHAPTER 5: LINKING GOVERNANCE MECHANISMS TO THE DIFFERENT TYPES OF INNOVATION (THIRD ANALYSIS)

This chapter presents the results of the fifth research phase and the third analysis phase. It consists of exploring the links between each governance axis (project, intra-organizational and inter-organizational) and innovation by looking at how each governance theme (mechanism) varies from one family of IT initiatives to the other. This third analysis phase will focus on only the nine prototypes selected in the previous chapter (three prototypes in each family). In consequence, the tables with the coding scores exported from Nvivo as well as the calculations of the total and average occurrences will be adapted and limited to the prototypes.

5.1 PROJECT GOVERNANCE AND INNOVATION

In this section, the major project governance themes are analyzed and compared. All themes presented here are project related governance mechanisms for both efficiency and innovation and some of the major success factors of strategic IT initiatives.

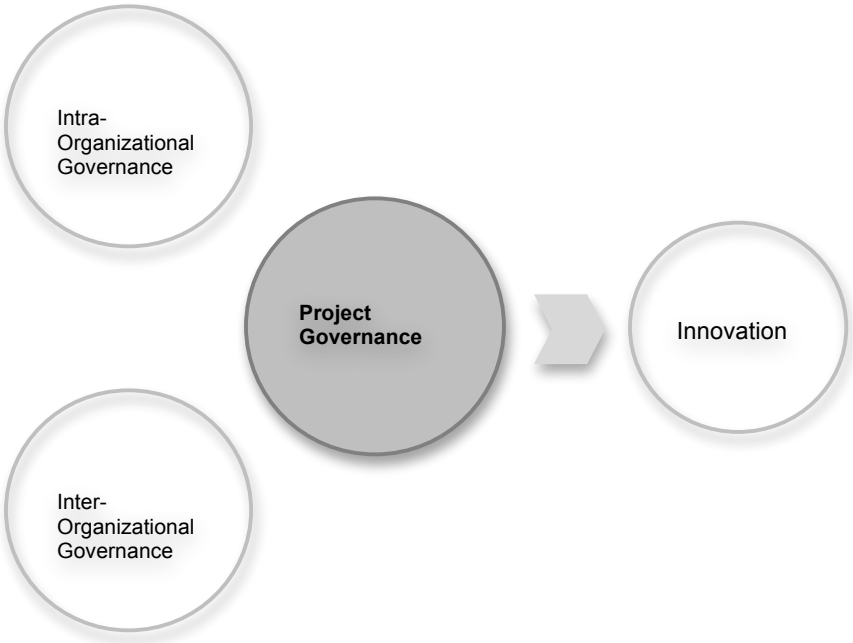

Figure 5-1 The Project Governance block

5.1.1 Primary Project Governance themes

At the end of the qualitative analysis process, eleven primary themes were identified in the Project Governance block. The table below presents the scores of the primary Project Governance themes for each one of the nine selected prototypes.

Table 5-1 Scores of all primary themes in Project Governance for the prototypes

Project Governance (primary themes)	1: CRM - ENERGY	2: CRM - RESORTS	3: ERP - FOOD	4: BASEL II - BANK	5: ECM - DEFENSE	6: PLM - AEROSPACE1	7: DDS – THEME PARK	8: MC - OPTIC	9: PLM - ENERGY	**TOTAL**	**AVERAGE FREQUENCY IN ALL CASES**	**% OF CASES COVERED**
1: Roadmapping	18	5	10	10	3	8	12	15	20	**101**	**11.22**	**100%**
2: Modularity	6	8	4	18	1	6	11	5	3	**62**	**6.89**	**100%**
3: Performance Criteria	8	3	9	5	9	3	14	8	3	**62**	**6.89**	**100%**
4: Strategic Planning Sessions	8	2	6	1	12	7	2	2	5	**45**	**5.00**	**100%**
5: Committees	1	2	3	3	3	6	11	1	3	**33**	**3.67**	**100%**
6: Governance Rules & System	2	2	7	0	9	1	2	8	0	**31**	**3.44**	**78%**
7: Project Reviews	0	3	7	4	1	0	9	2	0	**26**	**2.89**	**67%**
8: Funding Process	3	0	0	1	9	4	0	4	0	**21**	**2.33**	**56%**
9: PMO Role & Nature	3	2	0	8	0	0	0	3	1	**17**	**1.89**	**56%**
10: Security and IP	0	0	0	2	3	3	0	1	4	**13**	**1.44**	**56%**
11: Trust & Transparency	3	1	0	0	5	0	2	0	1	**12**	**1.33**	**56%**
TOTAL	**52**	**28**	**46**	**52**	**55**	**38**	**63**	**49**	**40**	**423**	**47.00**	**100%**

The above table shows that the five first themes (Roadmapping, Modularity & Portfolio Management, Performance Criteria, Strategic Planning Sessions and Committees) occurred in 100% of the prototype cases. On average, Project Governance themes occurred 47 times in each case, and the highest scores are seen in the DDS-THEME PARK and ECM-DEFENSE prototypes.

The following pie chart illustrates the relative weighting of Project Governance themes with Roadmapping being the most important primary theme and Trust & Transparency being the least important primary theme.

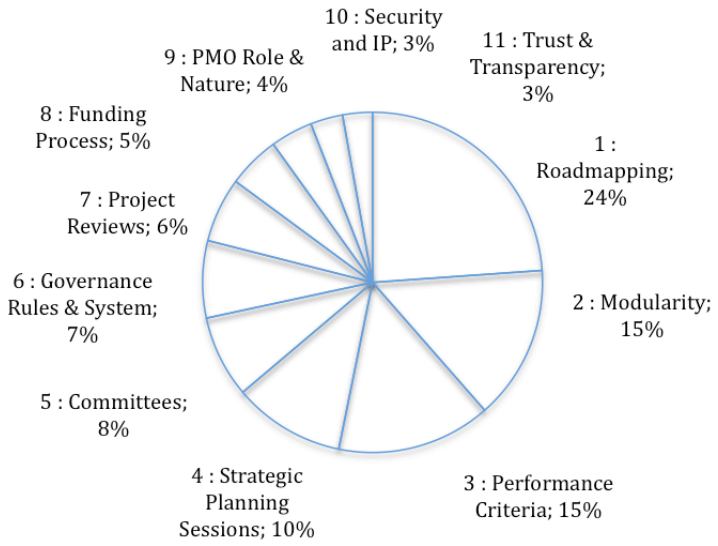

Figure 5-2 Relative importance of primary Project Governance themes

The first four Project Governance themes account for more than two-thirds of all references to Project Governance. In the following pages we will look at each theme independently and focus on those that are most significant ones in growth-oriented initiatives (Family 3). We will also explore the various examples and nuances put forward by respondents. A priori, the overall scores (frequencies) show an increase in frequencies in Family 3.

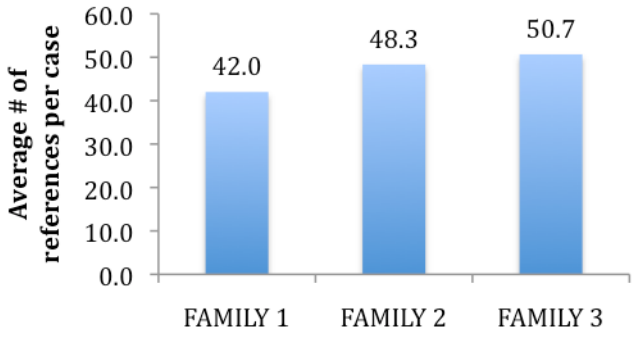

Figure 5-3 Average Project Governance scores in every family

The following two graphs present the comparative coverage and density of Project Governance themes in each of the families of initiatives. These two measures will be used to compare the

overall scores of each governance dimension in this chapter. While the coverage indicates the percentage of primary themes that occurred at least once in the family, the density is calculated by dividing the average frequency by the coverage percentage and reflects the emphasis that respondents put on a particular theme.

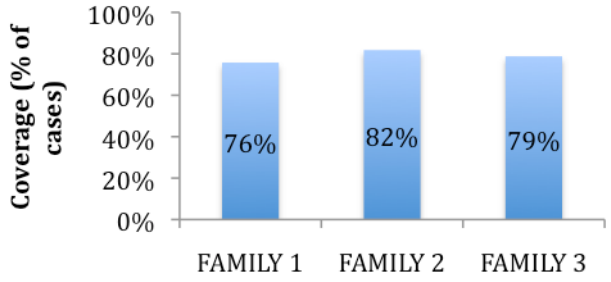

Figure 5-4 Average coverage for Project Governance themes in the families of initiatives

Coverage is slightly higher in Family 2 (above) and density (or intensity) is higher in Family 3 (below). The variations in both case coverage and theme density are not very high on a general Project Governance level.

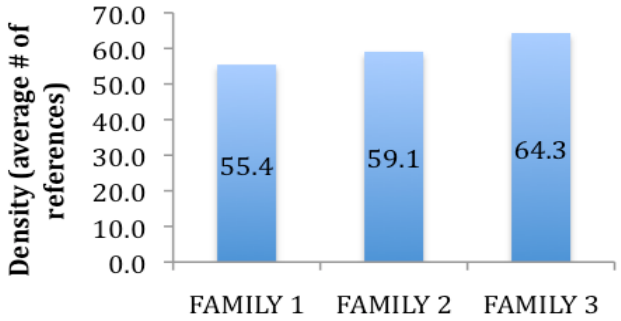

Figure 5-5 Average density for Project Governance themes in the families of initiatives

The scores of the eleven primary Project Governance themes for each of the three project families (using only the prototype cases) are presented in the following chart:

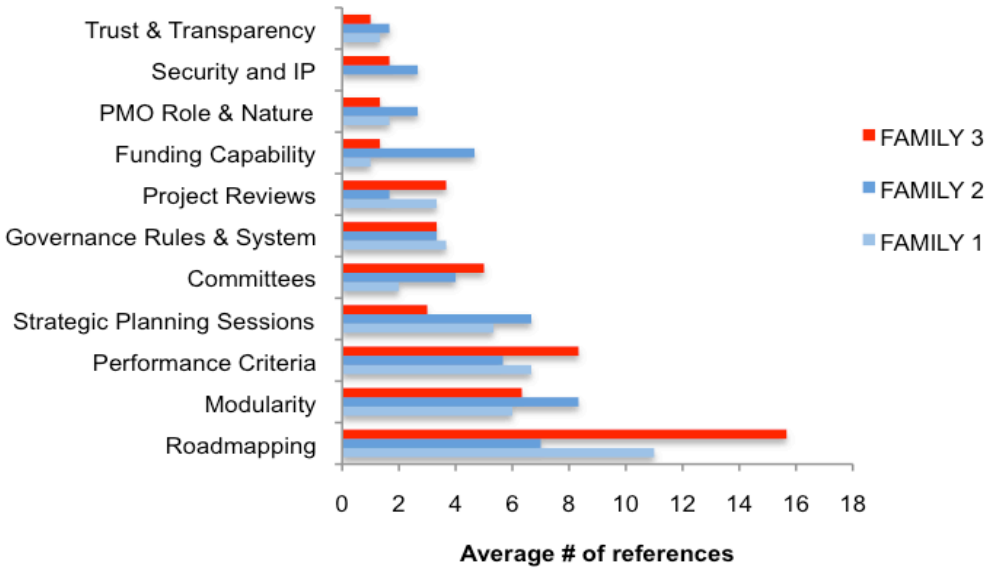

Figure 5-6 Scores of all primary Project Governance themes

Key Project Governance themes in growth-oriented initiatives

As shown in the above chart, the key innovation drivers in Project Governance are: (1) Roadmapping; (2) Modularity & Portfolio Management; (3) Performance Criteria; (4) Committees and (5) Project Reviews (see the above chart for illustration). Interestingly, efficiency-oriented initiatives (Family 1) never scored higher than both mixed and growth-oriented initiatives at the same time. The five key project governance mechanisms for growth-oriented initiatives are emphasized and presented first in the following pages.

i) Roadmapping

This theme gathers various descriptions of project roadmaps and episodes. It reflects the exploratory way in which the projects are structured and managed over time and how the roadmaps are constantly rewritten and communicated. The theme occurred in 100% of the prototypes and accounts for around 24% of all Project Governance themes.

The graph below shows the higher scores of the Roadmapping theme in growth-oriented initiatives (Family 3). On average the theme occurred 13.7 times in Family 1, 8.83 times in Family 2 and 14.5 times in Family 3. Nonetheless, Roadmapping is more important in efficiency-oriented initiatives (the largest projects) than mixed initiatives because of the large size and complexity of the CRM and ERP projects.

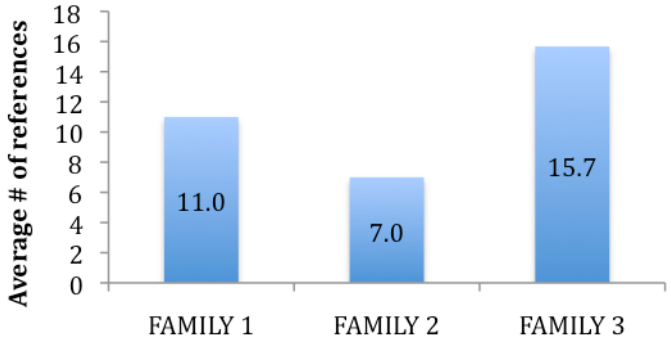

Figure 5-7 Scores for Roadmapping in Project Governance

Here is a quote from the DDS-THEME PARK case that explains how CIOs see and describe the roadmapping process:

> *Roadmapping involves phasing [which] consists in saying: BtoB component, 2 channels, BtoC component, Internet component, call center component, and then afterwards the third aspect for the Roadmap, the new marketing Website, Direct Marketing.*

The excerpts below are good indicators of project complexity, the ongoing review of project phases (roadmaps) and their sequence, the fuzziness of the process characterized by uncertainties, changes and feedback loops, and the variety of project components and modules addressed at once.

In the PLM-ENERGY case for instance, the roadmap consisted first of a pilot project phase where the consultant (IBM) invested about $1 million to come up with a prototype of the

innovative solution. This first proposal lasted about six months. The episode was followed by the Proof of Concept phase where both IBM and SNC Lavalin contributed together to about 80% of the work. In this phase, the client wore the project management hat, SNC wore the business hat and IBM wore the technology hat.

According to the respondent, the Proof of Concept was followed by a "convincing" operation to convince the users and decision makers to adopt the innovative solution. Both episodes took approximately 18 months. The next episode was the Architecture phase and it included the preparation of a specific catalogue for the client. The Architecture phase was followed by the Project (or execution) phase. The Project (execution) phase in the PLM-ENERGY case consisted of delivering images or versions of the solutions, each image taking approximately 6 months to set up. The following table presents excerpts from the interviews in the growth-oriented initiatives (Family 3):

Table 5-2 Excerpts for Roadmapping in Family 3

Project	Examples from interviews
PLM-ENERGY	- *In our mind, the pilot project lasted one year.* - *Once we were sure that we had something viable, it was necessary to convince people at [the client's company] that we were not just car and plane people. It was an extremely long phase involving negotiations, we did not address price at this stage, it was a matter of philosophy: why would [the client] go with a partner offering an integrated solution?* - *The second phase is probably the most critical. Simply selling something to someone does not necessarily mean that they have bought into the technology, the important thing once the legal contracts have been signed is to ensure that people really use the technology …* - *After that, in terms of Concept Proofing it is 20% [client] management and I would say maybe a 40/40 split between SNC and IBM.*
MC-OPTIC	- *It's hard to say: the first phase, which will last for a certain length of time, is to manage to refine the new business model, this is the key thing, there was no agreement on this.* - *The project has stretched over two years. The length of time between taking a decision to do something and start-up takes two years.* - *The second phase is to agree on the technical architecture, therefore, in short: once again do we build a centralized web service platform? Or should we install small things in each of the labs.* - *The sixth phase currently in progress is general deployment.*
DDS-THEME PARK	- *It is very hard to say because there are: (1) general design phases involving ten people, and in (2) development phase, another innovation: offshore development, therefore up to 30 development people and afterwards we return to the (3) test phases involving 15-20 people.* - *The first [phase] was to devise a Roadmap, the existing software package, we created a phase called Donald, the true Roadmap, i.e. how much project we will sell, what the sequences will be like, therefore DSR1s, DSR2s, DSR3s, etc.* - *The second phase was to make an actual General Design on the Web. Involving us and by the consultant and naturally Business representatives, absolutely.*

In highly innovative initiatives like the PLM-ENERGY and the EHR-HEALTH cases, roadmapping is critical and longer than usual because of the projects' exploratory nature, higher uncertainty and the need for extensive research, testing and negotiation processes. Here is a description in the PLM case:

> *In terms of concept proofing, there were lots of things to demonstrate, for example our PLM solution could mimic internal systems …*

In such circumstances, IT managers need to work out their project roadmaps in collaboration with both internal and external stakeholders and these roadmaps need to be clearly communicated to everyone involved or impacted by the project. In the words of the respondent in the EHR-HEALTH case:

> *There has been a lot of work on preparation, negotiation, search for financing, discussion, setting up partnerships, contract signing deadline, ordering all equipment and infrastructure, etc.*

The CIO in the MC-OPTIC case describes the difficulties in defining the business model and the lack of consensus at the front-end:

> *It's hard to say: the first phase which takes quite some time is to define the new business model accurately, this is the key thing, there was no agreement on this.*

In the DDS case, the project began with a roadmap phase where the project was modularized (see next theme for more details on the way projects were modularized) and decomposed in manageable chunks followed by a General Design phase where the business managers' involvement was critical and then a Detailed Design phase conducted primarily by the consultants and validated by the buyer. These front-end activities were followed by the Development and Tests phases (most of the development being off-shored by Accenture).

On the other hand, efficiency-oriented initiatives (Family 1) can show long and tedious front-end episodes often because of political and cultural issues. The CIO in the ERP-FOOD case gives a good explanation:

> *As I told you at the beginning we had high acceptance problems for the project, political problems: one project stage was called Value Realization, a preliminary stage in which we examined all Processes in the subsidiaries.*

Both project families scored lower on average than growth-oriented initiatives and mixed initiatives (Family 2) showed the weakest scores. The following table presents excerpts for the theme in Family 1:

Table 5-3 Excerpts for Roadmapping in Family 1

Project	Examples from interviews
CRM-ENERGY	- *Before creating the roadmap, we took one year to examine the IT needs of the business. We discovered that only 30% of the business was supported by our IT systems. This is what really triggered the project.* - *The whole pre-project phase took about two years and was part of our roadmap.* - *We thought it would be better to invest at the beginning and to make sure we understood and controlled everything. We took two years because we wanted to make the right decision.*
ERP-FOOD	- *In every subsidiary, our people try to define and plan their own IT needs and to determine what is really important for them. Therefore, we have a roadmap for each subsidiary that is validated by the group in terms of standards, logic, implementation, etc.*
CRM-RESORTS	- *We project the roadmap and in each episode we review if necessary and adjust the framework.* - *I always show the roadmap. I think the roadmap removes anxiety and psychologically helps everyone to align. We are no longer scared of not succeeding because we see all the steps and I think the roadmap is a great tool for effective teamwork.*

In the ERP-FOOD case, a Master Planning phase followed the Value Realization phase (described above) where various roadmaps were jointly created between the CIO and his various subsidiaries through their individual IS Committees.

Table 5-4 Excerpts of Roadmapping in Family 2

Project	Examples from interviews
BASEL II-BANK	- *I call my next three years, the efficient delivery years. These are delivery years in my roadmap but we will still have a few projects in the feasibility stage, around 25% of the envelope.*
PLM-AEROSPACE1	- *Well, there's Visioning, there's Validation of the Visioning, or Rationalization of the Visioning, and then I would say the third step is the Phasing, where you decide at what rate you wish to engage in this project, how quickly you want to integrate your components, or the development of the Roadmap.*
ECM-DEFENSE	- *We used the roadmap to convince an important group in the business. We actually took three months to get the buy-in of the operations directors, a critical managerial layer for this project.*

In one of the cases in Family 1, the front-end phase (the concept initiation phase) consisted of a six months period split in two sub-periods of 3 months each to prepare a detailed business case for investors and then to sell it internally. Here is a description by the IT manager:

> *The second 3 months period was spent working through committee structures so […] getting consensus, the various pushbacks that you get from a business case and eventually combining presentations and getting the approval to go.*

Once the business case was sold internally, the functional design and architecture phases were initiated. The business case, functional design and architecture phases were all part of the concept initiation phase. The planning and execution phases followed with a first release of front-office functionalities and a second release of back-office functionalities.

The roadmap structure in large and efficiency-oriented initiatives is straightforward and often predetermined by tested methodologies. For example, the CRM-ENERGY project was organized with a Capgemini methodology. However, the Capgemini methodology was only used in the project execution phase, not in the two-year pre-projet phase. In the respondent's words:

> *When we went into "project" mode, we used Capgemini approaches and tools to manage this sort of project: methodologies, approaches, etc.*

In growth-oriented initiatives (Family 3) like the PLM-ENERGY initiative, the detailed estimation of the project costs is not an important component of the front-end phases and not always a criterion for approval. In general, respondents in growth-oriented cases (PLM-ENERGY, DDS-THEME PARK, MC-OPTIC) emphasized more the roadmapping process with a special focus on the iterative activities and the need for constant communication. These respondents identified several phases specific to their IT initiatives whereas those in efficiency-oriented initiatives (CRM and ERP) described the general and more standard project phases found in normative project management frameworks (PMBOK) and the methodologies sold by IT consulting companies like Capgemini and Accenture. For instance, the excerpts in the MC-

OPTIC case presented above provide a really good account of project specific and innovative roadmaps. The CIO in the CRM-RESORTS case testifies about the more standard roadmaps in CRM and ERP initiatives:

> *The answer is quite simple. In a CRM project, overall, phases are always quite similar.*

As seen in the above examples, Roadmapping is a major project governance mechanism where ideas and visions of internal and external IT stakeholders are confronted, where joint plans are built and where initiatives are split in iterations and modules for faster delivery and innovation. In the DDS-THEME PARK case for instance, senior consultants at Accenture had a critical role in the creation and development of the roadmap.

In sum, here is what characterizes the roadmapping process and the project episodes in growth-oriented initiatives as opposed to mixed and efficiency-oriented initiatives:

- The front-end and pre-project phases are long and include negotiations, pushbacks, several iterations and risky misunderstandings. The process however does not resemble that of efficiency-oriented initiatives where detailed design is emphasized.
- The collaboration and communication efforts in the roadmapping process are significant and increase with the level of transformation and uncertainty.
- The nature and activities of project phases are case specific and standard methodologies or normative techniques are seldom adopted.
- The entrepreneurial spirit drives the process.
- At the end of concept initiation or business case episodes, detailed estimations of project costs are not necessary for approval.
- The project is split in manageable sub-projects and modules are delivered progressively. Roadmaps and project plans are re-examined at the end of each delivery.
- Senior IT strategy consultants often contribute with critical ideas (see next sections for the roles of consultants in front-end and strategic activities).

ii) Modularity

The theme describes the way the IT initiative is split in smaller chunks for flexibility and risk management. It also reflects the need to manage the complexity of the IT development in both the enterprise and the project architectures simultaneously. As previously seen, one of the major components of an innovative IT project roadmap is the way the project is modularized and split in independent deliverables. IT managers incorporate and communicate decision rules and mechanisms for modularity and portfolio management. These rules and mechanisms provide practical solutions to address the risks and uncertainties in innovative IT projects.

For instance, the CIO in the DDS-THEME PARK case highlighted the following two major risks: (1) reinventing everything and coming up with long and expensive projects and (2) projects are interdependent and have bad interferences between each other.

The Modularity theme accounts for 15% of all primary project governance themes in the study and ranks second after Roadmapping. The theme also occurred in 100% of the prototypes.

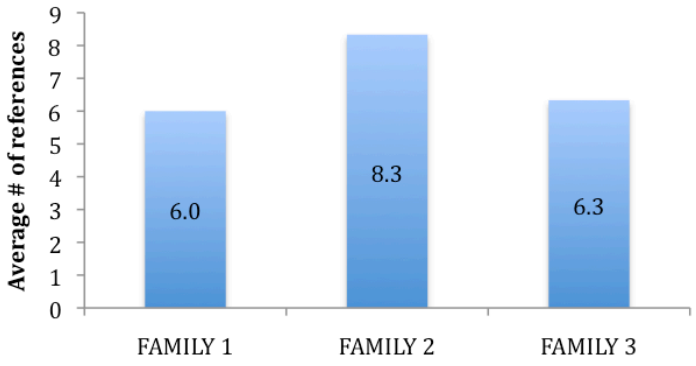

Figure 5-8 Scores for Modularity in Project Governance

The average score in Family 2 is higher because of the banking case (BASEL II-BANK) that highly emphasizes the portfolio management of investments. The following table presents Modularity excerpts in Family 2:

Table 5-5 Excerpts for Modularity in Family 2

Project	Examples from interviews
BASEL II-BANK	- *I decorticated my projects in the PMO in small pieces to rapidly get concrete benefits.* - *You would see many pieces. Today, we have 50 projects and before we just had 10 projects.* - *We did a risk analysis to determine which projects are the most risky and we secured the ones with the lowest levels of risk. This is my lame duck theory. You don't send three lame ducks at the same time to eat at the dock. You make sure one can go first and then you send the others.*
PLM-AEROSPACE1	- *We concluded that we had to do this project in phases; the PLM system was not a mature product yet (unlike SAP) because of investments, because of the technology readiness and to some extent to the organizational readiness.* - *We're taking small steps.*

In one of the cases in Family 2, the CIO called modularity a "component based architecture" and explains what it enables him to do:

> *This is why I prefer the component based architecture because it enables you to manage risks, manage deliverables, and manage costs. The modular architecture allows me much more flexibility and much less risk over time.*

Excerpts for the theme in Family 1 are presented in the following table:

Table 5-6 Excerpts for Modularity in Family 1

Project	Examples from interviews
CRM-RESORTS	- *Note that the modularization is always business based in such projects. Using IT episodes to modularize your project won't provide any benefits to the users.* - *You always start with the most effective module, the one that can be the most profitable and the one that your know you are capable of easily delivering to show your user or clients that things are moving forward. So you start with the easy modules at the beginning and in parallel you launch the more complicated projects.*
CRM-ENERGY	- *We broke the project in 16 pieces in time, 3-4 months each. These are 16 workloads that help you manage your project and delivery faster.* - *This is what enabled us to greatly reduce the complexity of the huge task we had to conduct.*
ERP-FOOD	- *We delivered in one subsidiary at a time but not in one module at a time. It would be crazy to deliver one module at a time because you would always have to develop interfaces with the legacy systems.*

As seen in the above Family 2 excerpts, Modularity is more important when the IT manager is addressing a large portfolio of projects simultaneously. The CIOs in mixed initiatives developed a capability for managing an ongoing portfolio of ambitious IT projects. This capability creates a unique dynamic in the IT division that differs from the more traditional way of managing the large projects seen in efficiency-oriented initiatives (Family 1). In the words of one of the CIOs in Family 2:

I'm attacking my legacy issue in a bunch of places at the same time and a lot of the McKinsey type [people] will tell you 'don't do this, pick one and get it done then pick the other one and get it done.

The most generalized modularity principals seen (especially in highly innovative project) are to begin delivering the modules that (1) rapidly create value for the business, and (2) are easier and less risky to implement. To maximize value creation, the modules are first implemented in the departments that can benefit the most from the new functions. The projects are thus split in chunks that make business sense and bring exciting and practical functionalities to the business. Respondents underline the importance of structuring the modules around business needs and not around IT needs. According to certain respondents, the cost-benefit analysis of modules is critical for managing priorities and for scheduling the delivery of IT modules. Here is a quote from one of the respondents in Family 3:

It is about the financial realities in each organization therefore it is a matter of trying to achieve the greatest added value for the lowest investment.

This table presents excerpts for Modularity in growth-oriented initiatives (Family 3):

Table 5-7 Excerpts for Modularity in Family 3

Project	Examples from interviews
DDS-THEME PARK	- *One of the innovations in this initiative is the way we are managing several project simultaneously: (1) a new website to generate demand, (2) the sales of resort stays, (3) the ticket sales, and (4) direct marketing a posteriori. We broke the initiative in distinct components.* - *Modularization, enterprise architecture, urbanization, whatever you call it. The idea is to know what you want from a business perspective and to modularize into processes and components. You really have to de-risk projects between each other.* - *Then you can use pilot units to explore the new module. So instead of a big bang implementation, we explore test the new module in a single subsidiary first. For example we would try the new website in Paris first.*
MC-OPTIC	- *The episodes are mixed, all modules are conducted in parallel and they constantly overlap. We are addressing all the problems at the same time.* - *I have portfolio managers in my teams and their work is to manage contracts with internal clients.*
PLM-ENERGY	- *We were sure we would make it happen so instead of increasing the complexity of the initiative we tried to make things as simple as possible for the client.*

Both risk analysis and cost-benefit analysis appear to be important for the sound scheduling of project modules even though costs are harder to estimate in some cases. The initiatives where respondents emphasized modularity and portfolio management the most showed stronger program management and portfolio management capabilities and the key ability to manage large number of smaller projects simultaneously. For instance, in the BASEL II-BANK case, the project was split in 50 smaller projects for manageability. In these cases, the respondents highlighted their ability to decompose their initiative in smaller digestible chucks (managed in parallel) and for justification compared themselves to the weaker and direct competition. Here is what the respondent in the BASEL II-BANK case said about the direct competitor:

> *Moreover, Banque Nationale, the only bank that missed its requirement in terms of deadlines, did not manage to normalize all its data successfully because, precisely, it was too big and its needs were not clearer and they did not make it.*

Another reason for splitting a project in smaller chunks is the ability to continuously incorporate new IT advancements from the outside and to adjust to new business developments. The CIO in the CRM-RESORTS case explains it clearly:

> *The business continues to evolve and therefore doing very large projects, means entering a tunnel effect where by the time that we finally deliver something, the world has changed and it is already necessary to improve it even before it has been used, therefore it is a very complicated chain.*

Also, modularity enables the demystification of innovative projects and the reduction of complexity and uncertainty, which leads to a better understanding of the project benefits. According to the respondent in the BASEL II-BANK case, the creation of manageable modules helps shift the attention of senior managers from project costs to project benefits and this has a positive impact on the overall performance.

When IT initiatives are more innovative and riskier, firms launch the new modules in pilot units for testing and to get feedback from users before scaling up the project. That was the case in all

the growth-oriented initiatives. Respondents also emphasize the positive impact of modularity on the quick delivery of new functionalities that in turn creates trust, excitement and a helps the CIO maintain a healthy and effective relationship between his team and the business. Here is how modularity positively affects relationships in one of the cases in Family 2:

> *A long-term implementation for me is a year, so I want to deliver functionality to the business that the business values within 12 months. So we do phasing and things like that and we deliver to the business so the business goes "Oh god I love that! Keep going".*

In the words of the CIO in the CRM-RESORTS case:

> *We are trying to plan in advance by producing the strategic plan […] but above all we are trying to break it down into phases, so that each phase makes an immediate contribution to daily life.*

In efficiency-oriented initiatives, deployments are generally done unit-by-unit and not module-by-module. For instance in the ERP-FOOD case, all the SAP modules were implemented simultaneously but in one subsidiary at a time.

Even though Modularity was not emphasized as much in growth-oriented initiatives (Family 3), these cases share the following characteristics:

- Large projects with simultaneous deliverables are not recommended.
- Initiatives are decomposed in smaller digestible chunks or modules.
- The most beneficial, easiest and less risky modules are delivered first.
- The innovative IT modules are often tested in pilot business units.

A critical modularity benefit advanced by several respondents is the stabilization of scope and the ability to induce flexibility and manage change without disturbing the module delivery process. The BASEL II-BANK case for instance illustrates that instead of changing the scope of a single module (or initiative), one should increase modularity and induce flexibility in the

overall program. Once a module is defined and planned, the goal is to execute fast without interruption.

iii) Performance Criteria

The theme describes the criteria used by managers to create the incentives and to direct the work and actions of team members that would align the IT initiative to the strategic goals. The performance criteria found were split in two distinct groups: (1) business performance criteria, and (2) project performance criteria. The first group of criteria reflects the project's connections to business strategy and the various departments needing the new system and the second group reflects the importance of the normative project management criteria. The following table compares the two types of performance criteria (business and project) for every project:

Table 5-8 Scores of Business and Project performance criteria

Performance Criteria	1: CRM - ENERGY	2: CRM - RESORTS	3: ERP - FOOD	4: BASEL II - BANK	5: ECM - DEFENSE	6: PLM - AEROSPACE1	7: DDS – THEME PARK	8: MC - OPTIC	9: PLM - ENERGY	**TOTAL**	**% OF CASES COVERED**	**% OF TOTAL**
1: Business Criteria	2	0	0	3	1	0	3	3	1	13	66.7%	20.0%
2: Project Criteria	8	3	9	2	8	3	12	5	2	52	100.0%	80.0%
TOTAL	**10**	**3**	**9**	**5**	**9**	**3**	**15**	**8**	**3**	65	**100%**	**100%**

The results here are interesting: about 80% of all performance criteria mentioned by respondents are business criteria and only about 20% are project criteria. Additionally, the business criteria were mentioned and even emphasized by 100% of the respondents whereas project criteria were only mentioned by two-thirds of the respondents. The graph below shows the distribution of business and project criteria throughout the three project families:

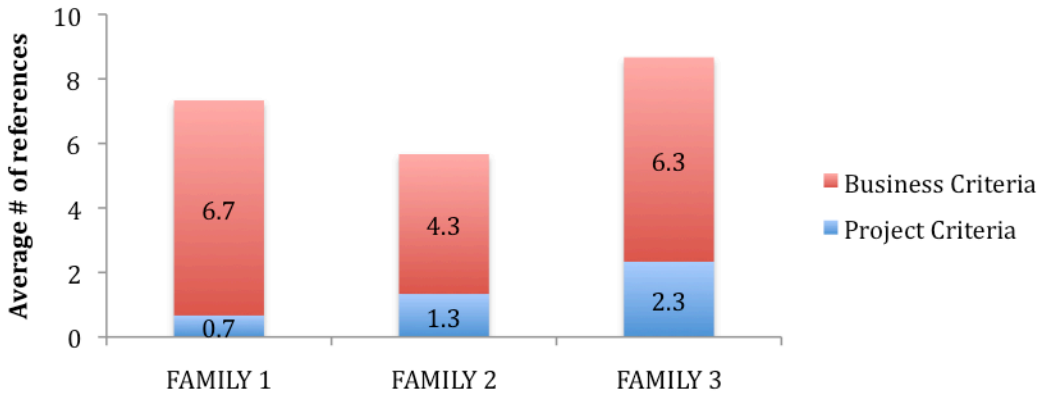

Figure 5-9 Scores for Business and Project Criteria in every project family

In general, performance criteria occurred more frequently in growth-oriented initiatives (Family 3). On average, performance criteria occurred 8.6 times in Family 3, 5.6 times in Family 2, and 7.4 times in Family 1 (see the above graph). The following table presents business criteria excerpts in Family 3:

Table 5-9 Excerpts for Business Criteria in Family 3

Project	Examples from interviews
DDS – THEME PARK	- *Business lessons learned.* - *Have we simplified the business rules in the right way?* - *Is the direct versus indirect business ratio increasing? Yes.* - *Have we built a competency center? Yes.* - *Have we certified the resources? Yes.*
MC - OPTIC	- *The first criterion is: Is it working? Are the clients satisfied? The clients are the external labs. Things are currently going well and we have three pilot laboratories: Germany, Switzerland and the US. Client satisfaction is really good.* - *The second criterion is business development. Is the business growing and is the project profitable?*

Excerpts for business criteria in Family 1 are presented in the following table:

Table 5-10 Excerpts for Business Criteria in Family 1

Project	Examples from interviews
ERP-FOOD	- *We are considered a reference in best practices on the SAP market first because we were able to maintain the unique core model in a consistent way.* - *Another way to measure the benefits is to look at the IS costs through time.*
CRM-ENERGY	- *We need to satisfy the energy board and what they want is to make sure the client gets quality energy and a good price.* - *I have expected benefits of $20 million in my processes.*
CRM-RESORTS	- *The first performance criterion is the increase in revenues, this is a sales website.* - *You look at the payback on the costs and investments. You look at market penetration.*

Family 1 (efficiency-oriented projects) ranks second in business criteria. On the other hand, respondents in Family 2 did not describe their performance criteria with the same ease and precision. As a result, fewer business criteria (and performance criteria in general) were identified. The table below presents excerpts for business criteria in Family 2:

Table 5-11 Excerpts for Business Criteria in Family 2

Project	Examples from interviews
ECM-DEFENSE	- *We calculated the ROI by estimating the economies we would do with the new solution.* - *The user satisfaction is another critical element.*
PLM-AEROSPACE1	- *About 90% of the people are now using CATIA V5.* - *To make sure it would be a success, the project had to be on the president's agenda.* - *But the business did a great job in keeping the place running while they supported the project and still reached the company's goals that year.*
BASEL II-BANK	- *The rate of progress and the acceleration, because we are part of Gartner surveys, is a major criterion.*

Here is an interesting description of critical business criteria by one of the respondents in mixed initiatives (Family 2):

> *What is the absolute number one priority over absolutely everything that we do in Tech? Our number one priority is to keep the machine running. It trumps everything else. I don't care what your project is mister executive if I can't keep the machine running, and we're out of business.*

It is obvious that all IT managers share a profound interest in satisfying the buyer's business needs before worrying about the cost, delay and scope of their projects. The business criteria examples presented above clearly showcase the managers' understanding of their initiatives' business case and the critical business issues. Furthermore, two levels of business criteria and rules were found: (1) used to manage the overall IT function, (2) used to manage the specific IT projects. The first level business criteria can indicate the existence of strong processes and mechanisms linking the IT project in question to a coherent and department-wide IT structure and strategy and to other IT projects. Even though such processes and mechanisms existed in all cases (explored consequently), respondents did not necessarily see them as performance criteria.

Additionally, these higher-level business criteria were not emphasized because respondents were asked to focus on a specific project.

Growth-oriented initiatives use fewer types of business criteria even though they score higher on the overall frequency. In fact, the more the project is exploratory and innovative, the harder it becomes to quantify its performance. Here is what the respondent in the MC-OPTIC case said about the difficulty to measure the project's attributes:

> *It is so disruptive and innovative, we have no points of reference, and it is not worthwhile estimating project cost; the margin of uncertainty is such that it is not worthwhile.*

The table below presents the key characteristics of each one of the business criteria identified :

Table 5-12 Key characteristics of business performance criteria (cont'd)

Business Criteria	Key characteristics
1. The system's ROI and efficiency gains	- This business criterion is the most frequently seen in the research. To measure this performance factor, managers conduct cost-benefit analyses of their project. - In more than half of the cases, the respondents mentioned ROI and efficiency gains as major performance criteria. These cases include some of the most innovative projects seen in the research (Family 3). ROI and cost-benefit analyses can also be critical in projects where innovation, growth and strategic renewal are more important than efficiency and cost reduction. - The respondents presented this issue in various ways. In the ECM-DEFENSE case for instance, the company used other performance criteria to financially justify its large-scale collaboration project like the direct gains in travel costs cuts through its new Web conferencing technologies and the gains from centralizing the IT architecture and using a smaller team internally and less external developers and support teams. Even though the project would affect the IT team, at least the impact is localized and controllable and not transversal affecting business units and other functions.
2. Business growth and development	- This criterion illustrates the positive effect of IT projects on business growth, quality enhancement and innovation. For instance, in the CRM-RESORTS case the increase of revenues is the major performance criterion for the CIO. In the MC-OPTIC case, the CIO considers business growth and development as the second performance criterion (after client satisfaction) - Most initiatives where business growth and development criteria were used are growth-oriented initiatives (Family 3). These criteria often take longer to measure than efficiency gains, client satisfaction or internal acceptance and are thus harder to use.

Table 5-12 Key characteristics of business performance criteria (cont'd and end)

3. The client and business user satisfaction	- Client satisfaction and business user satisfaction are simple and direct measures that respondents intuitively mentioned in their response. IT managers can easily feel the satisfaction of users or clients and thus use the factors as critical indicators of the positive progress of their projects. - According to the respondent in the CRM-ENERGY case, the user satisfaction is measured and not one single employee wanted to go back to the old system.
4. The system's internal acceptance	- The internal acceptance and buy-in is a critical success factor in most IT initiatives. The intra-organizational relationships and governance mechanisms that link IT to the various business functions reflect the importance of such a performance criterion in IT projects. - A way of evaluating the internal acceptance of the new system is to measure the percentage of users who are actually using the new platform. This was the case in the PLM-AEROSPACE1 project where 90% of the people were using the new CATIA V5 platform.
5. The simplification of business rules and business integration	- In some cases, the simplification of business rules and business integration were the most important performance criteria. Given the complications and inefficiencies caused by the accumulation of legacy systems, some managers felt they had to make the problem their focus and priority. - The replacement of legacy systems and the simplification of business rules are used as both strategic priorities and performance criteria by some firms.
6. The implementation of a competency center and the certification of resources	- Competency centers are becoming common mechanisms in high performance IT functions. They are essential checklist items when integrating more mature platforms like SAP or when hiring IT consultants like Accenture. - Most competency centers were built in efficiency-oriented initiatives because consultants and vendors already had their blue prints.
7. Becoming an IT reference and using the tool to its full potential	- In two cases (ECM-FOOD and BASEL II-BANK), the IT manager highlighted the importance of becoming a reference company in their industry or a reference client for their supplier. - IT managers use this performance criterion as an intermediary objective for their IT teams. According to the CIO in the ECM-FOOD case, the 80 subsidiary food conglomerate obtained the best practice certification from SAP because it was the only food company able to use the platform's scalability feature to its full potential. Becoming an IT reference and the way tools are used to their full potential are thus two interrelated performance criteria. In the BASEL II-BANK case, the bank became a Gartner reference in Basel II implementations for its ability to progress and accelerate at a higher rate than competitors.
8. Keep the machine running	- Two respondents highlighted the importance of keeping the machine running. In other word, constantly making sure the new initiatives do not slow down or impede current business operations and performance.

Some of the second level business criteria are case specific; they were only mentioned in one case study and reflect the project's specific business case. Here are the important case-specific business criteria found:

Table 5-13 Case-specific Business Criteria

Business Criteria	Case:
1. Understanding, defining and adjusting the business case and requirements	ECM-DEFENSE
2. Increase the proportion of direct business versus indirect business	DDS-THEME PARK
3. Using strong methodologies, documentation and governance mechanisms like committees	DDS-THEME PARK
4. The project is an act of faith and not a rational reasoning	MC-OPTIC
5. The stability and continuity of the executive team supporting and sponsoring the project	CRM-ENERGY
6. Progress and acceleration	BASEL II-BANK

The fifth case-specific criterion for example was emphasized in the CRM-ENERGY case because of the way the instability of the organization's executive team affected the project. This is the only case-specific business criterion found in Family 1 initiatives. This criterion was not mentioned in other cases for two reasons: (1) because IT managers often take the executive team stability and continuity for granted, and (2) because the stability of the business as a whole is more critical in efficiency-oriented initiatives given the amplitude of the effects of such projects on mission critical business processes. In some cases, respondents specifically describe the negative effects of normative project management criteria like cost and delay in complex projects. In the BASEL II-BANK project, here is what the project manager said about the initial emphasis on budget:

> *But all people had was the budget in less than five months, so we have now stopped talking about money and we have demystified it and managed it realistically.*

In this case, the respondent attributes the project's initial failures and low performance (before taking over) to the previous management's focus on cost instead of substance.

iv) Committees

Committees are critical mechanisms used in innovative IT initiatives to manage and regulate a broad network of temporary and long-term decision-making relationships. The theme occurred in 100% of the prototypes and accounts for 8% of all Project Governance themes. The graph below shows a correlation between Committees and exploratory innovation. The results suggest that the

more innovative and uncertain the IT initiatives, the more committee structures are emphasized by the IT managers.

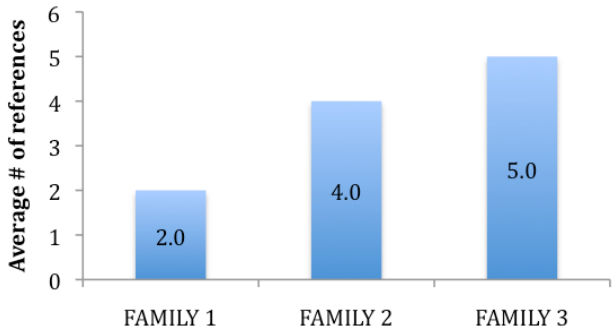

Figure 5-10 Scores for Committees in Project Governance

This table presents examples for the mechanism in growth-oriented initiatives (Family 3):

Table 5-14 Excerpts for Committees in Family 3

Project	Examples from interviews
DDS-THEME PARK	- *In all our steering committees we have two chairmen: (1) myself as CIO, and (2) the VP of Sales or the VP of Marketing, etc. We use the steering committee to arbitrate and direct.* - *We have two types of steering committees: (1) one project specific committee where we focus on the DDS project, and (2) one global committee where we look at the entire portfolio of projects.*
PLM-ENERGY	- *The IT committee organized monthly meetings in the pilot project where we would explore specific solutions in the various domains such as ventilation. Experts in ventilation or HVAC would come and present their specific solutions in a dedicated committee meeting.*

Even though growth-oriented initiatives (Family 3) score higher, the theme was not emphasized in the MC-OPTIC case; the respondent did not clearly describe committee structures used in the project. On the other hand, the CIO in the DDS-THEME PARK case gave a very clear account of the way his committees are structured and the way they function. First there are two steering committees used, (1) a temporary and dedicated committee specifically designed for the DDS project, and (2) a general and permanent committee where the DDS project is discussed with the other IT initiatives, and where the overall IT strategy is formulated and updated. Two chairmen are on the dedicated steering committee, the CIO and the business manager sponsoring the project. In this case, the business chairman is the VP of Sales & Marketing. The steering committee oversees two lower level committees: (1) the functional directors committee, and (2) the technical directors committee. The former is predominantly composed of business people who work on functional issues like the simplification of business rules and change management.

The latter is composed of IT people who work on technical issues like architecture, security and business intelligence.

Table 5-15 Excerpts for Committees in Family 2

Project	Examples from interviews
PLM-AEROSPACE1	- *We have an executive sponsorship committee.* - *Then we have senior management who act like stakeholders.* - *Then we have a governance committee set up with for example Dassault and IBM where we meet on a fairly regular basis to know where the project is going.* - *Each level of the governance has a different area of responsibility or authority if you wish.*
BASEL II-BANK	- *I put in place two committees that help me manage. The first committee I call the delivery committee and the second is the directors committee where scope-related decisions are made.*
ECM-DEFENSE	- *There is an operations committee that meets every month to make decisions about the critical topics of the initiative. The initiative's updates were constantly communicated to the committee at the time we launched it and we did three meetings before getting the approval for the initiative.*

The consultants (and sometimes the vendors) are also represented on these committees along with members from other functional departments like Finance and HR. The committee structures and the explicit rules used in their operation reflect the formality and discipline in growth-oriented initiatives. Here is an example of the rules used in the DDS-THEME PARK case:

> *Therefore we only refer up to the steering committee matters, which have not been settled by the technical committees or functional directors committee.*

Committees also use important documents to structure relationships and define the roles of stakeholders. In the DDS-THEME PARK case, the engagement rules in the project charter are critical for managing the relationship with software vendors.

Table 5-16 Excerpts for Committees in Family 1

Project	Examples from interviews
ERP-FOOD	- *The steering committee was created with the two sponsors who were the number 2 and number 4 of the group. These are very determined people.* - *The IS committee exists mainly to manage internal demand, to express the needs for IT solutions from the business perspective but also to communicate what we (the IT team) decide to integrate in the business units.*
CRM-RESORTS	- *You put in place simple governance rules including steering committees, monitoring teams, etc.*
CRM-ENERGY	- *To integrate the project team with the business we used existing management committees. The top management in these committees will help the project team take big steps. So we try to use the management mechanisms that already exist in the business.*

The excerpts and results in mixed initiatives (Family 2) show that Committees is more emphasized in the PLM-AEROSPACE1 case, the most innovative initiative in Family 2. PLM

platforms and concepts are also newer than the other ECM and financial platforms in mixed initiatives. In sum, the findings show that committee structures are more important when (1) the initiative is more innovative and exploratory, and (2) when external stakeholders are more involved.

v) Project Reviews

This mechanism is used to systematically address the changes affecting the initiative, to leverage the lessons learned form past failures and successes, and to make important decisions about future moves. The theme occurred in two-thirds of the prototypes and accounts for 6% of all Project Governance themes. The graph below clearly shows the stronger focus on Project Reviews in growth-oriented initiatives (Family 3).

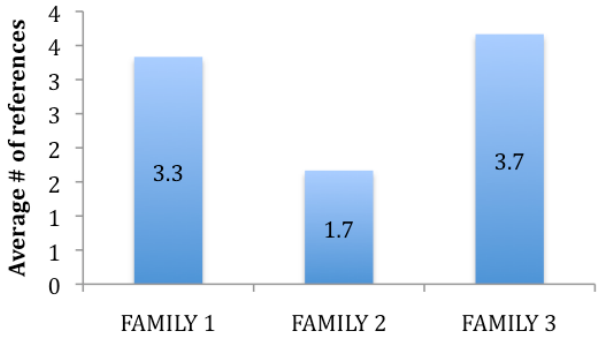

Figure 5-11 Scores for Project Reviews in Project Governance

In growth-oriented initiatives (Family 3) the debate is never over and there is no clear closure. Instead of closures or deadlines, project reviews are planned and conducted and roadmaps are redesigned. In the MC-OPTIC case for example, the mass customization project lasted two years but the debate was not over. Instead, after the company implemented the new system in 4 independent labs, a review was conducted and different alternatives were evaluated and compared. In the CIO's words:

> *But it is not finished yet; debates are still ongoing. Should we devote money to protecting our old business or rather should we invest in transformation to new business?*

Table 5-17 Excerpts for Project Reviews in Family 3

Project	Examples from interviews
DDS-THEME PARK	- *We are doing our first post implementation review, one year after the implementation started in April 2007. The deployment started in Euros and in English. Then we worked on the look and market, then France, Germany, Spain, etc. This will now be reviewed.* - *The current review shows that the business case still holds and we have typical lessons learned. We have project lessons learned, planning, costs, implementation, etc. and business lessons learned.*
MC-OPTIC	- *The project is never finished; we constantly have debates and conduct reviews.* - *In general the debate is always the same: is there a way to protect our incumbent business model? Should we invest in trying to protect this old business model or should we invest more in the transformation towards the new business model?*

Project Reviews are critical in growth-oriented IT initiatives because they provide the flexibility needed in adjusting to new realities and circumstances. Here is what the CIO in the DDS-THEME PARK case said about this process:

> *We also have what is known as Post Implementation Reviews. We will see that yes the business case holds and we have typical lessons learned. We have project lessons learned: planning, costs, implementation, etc. and business lessons learned.*

The following table presents excerpts for Project Reviews in mixed and efficiency-oriented initiatives that reflect the lower importance of the theme when initiatives are less innovative.

Table 5-18 Excerpts for Project Reviews in Family 2 and Family 1

Project	Examples from interviews
BASEL II-BANK	- *When I arrived, I did an assessment of the situation and found that we were heading in all directions.* - *We had to stop everything and start from scratch.* - *I started with the existing team, did my assessment, and replaced 15 of the 17 project managers.*
ECM-DEFENSE	- *Now we have a very complete business case that we will readjust based on the new realities.*
ERP-FOOD	- *We begin the project, the subsidiary runs with the new system and one year later we did an assessment of the value realization. In reality we would compare the reality with the benefits we had in mind at the beginning. Actually, we reached the planned benefits from a financial point of view but they did not come from where we imagined them to come from.*
CRM-RESORTS	- *The second episode that started after the first review was not exactly what we dreamed of at the beginning. So when you get to episodes 7 or 8 you have good chances of doing something you were not expecting.*

vi) Security & IP

This theme addresses issues related to IP ownership and to the security of confidential information and knowledge related to the IT initiative. The theme occurred in 56% of the prototypes and accounts for 3% of all Project Governance themes. Interestingly, Security & IP issues occurred in none of the efficiency-oriented initiatives and the theme has higher scores in mixed initiatives than growth-oriented initiatives.

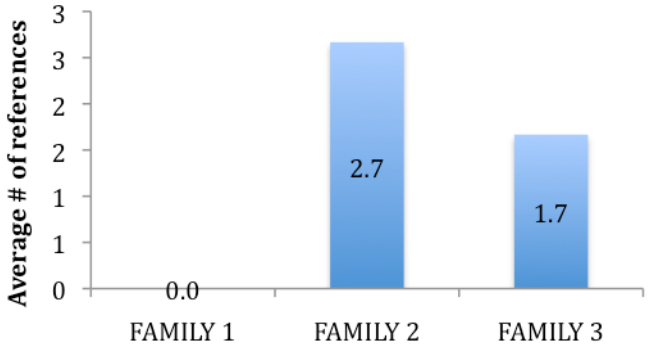

Figure 5-12 Scores for Security & IP in Project Governance

The respondents provide really clear and straightforward accounts of how IP and security issues can become problematic and how it is critical to address these issues early enough in the project. The theme is closely linked to the Contract Management theme presented in the inter-organizational governance section. When security and IP issues increase, project changes and complexity also increase. Excerpts for the theme in Family 3 cases are presented in this table:

Table 5-19 Excerpts for Security & IP in Family 3

Project	Examples from interviews
PLM-ENERGY	- *I remember a meeting with the three engineering consulting partners who are important suppliers. We were talking about sharing data and collaborating and it was not easy at all.* - *What was complex is the intellectual property, to whom it belongs to and how it would be shared.* - *And then those best practices belong to whom?*
MC-OPTIC	- *The core applications are at the heart of the business. This is where we want to translate the expertise of the business. This is a project you cannot outsource that poses a lot of security questions because you do not want the competition to have access to our algorithms. You need to take precautions with encryptions, etc.*

Only one CIO in the growth-oriented initiatives (in the MC-OPTIC case) decided not to partner with large consulting companies like IBM or Accenture and one of the major reasons was security and IP. Here a quote by the CIO about these security issues:

This is a project you cannot outsource that poses a lot of security questions because you do not want the competition to have access to our algorithms.

The security and IP challenges are great in the EHR case because of the sensitive patient data that can suddenly be transferred from one physical place to another in the same healthcare network. The challenge here is linked to moral and legal questions as opposed to commercial IP questions in all the other cases.

Table 5-20 Excerpts for Security & IP in Family 2

Project	Examples from interviews
PLM-AEROSPACE 1	- *If you look at what is really driving things now, there's a lot of conflict that people have to deal with, there's a move to do globalization of product development, you want to do a lot of things offshore, global call centers, at the same time we got a huge security problem in the aerospace industry, so on one side we're getting pushed to collaborate and on the other we're being told not to show your data for security concerns.* - *Commercial solutions like CATIA for example are available in Russia, in China, are available all over the world. If I take an in-house problem developed here and try to make it available in Russia and China, I will get to all sorts of problems.*
ECM-DEFENSE	- *Never forget that it is your duty to respect the confidentiality of the information processed and of what you hear. There is only one communication channel. This issue is repeated and reminded to everyone at the beginning of every presentation in the project.*
BASEL II-BANK	- *There was a human challenge in reaching an agreement over the common technology and platform and the way things and information would be shared between the subsidiaries. Once we had centralized everything the security issues increased because a lot more people had access to the same platform.*

In most Family 2 initiatives, information security was one of the project's major concerns and components. These systems contain very sensitive proprietary information.

Key Project Governance themes in efficiency-oriented and mixed initiatives

As previously seen, growth-oriented initiatives are consistently at one or the other end of the Project Governance spectrum. Growth-oriented initiatives (Family 3) scored lower than both mixed (Family 2) and efficiency-oriented initiatives (Family 1) with five themes. Funding Capability is the only exception here because growth-oriented initiatives and efficiency-oriented initiatives showed similar scores. These Project Governance themes are: (1) Strategic Planning Sessions, (2) Governance Rules & System, (3) Funding Capability, (4) PMO Role & Nature, and (5) Trust & Transparency.

i) Strategic Planning Sessions

Many of a project's success seeds are planted up-front in a strategic process that can take years to materialize. We've seen earlier that pre-project or front-end phases can be long and difficult in both growth-oriented IT initiatives (Family 3) and larger efficiency-oriented projects (Family 1). The front-end planning process is more emphasized in larger and efficiency-oriented initiatives (families 1 and 2) because of the nature of more mature platforms like CRM and ERP systems that reduce modularity and the ability to split the initiative in smaller and more manageable chunks. This theme accounts for 13% of all primary Project Governance themes and ranks fourth. The theme occurred in 100% of the prototypes.

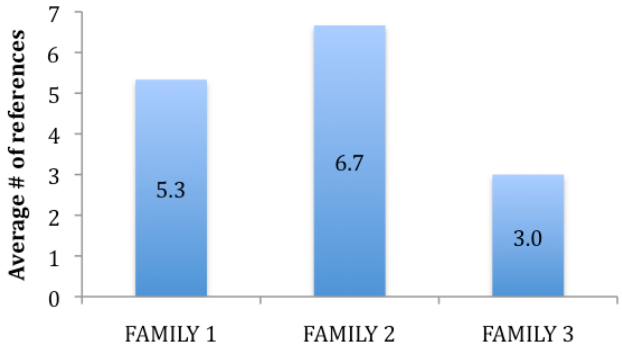

Figure 5-13 Scores for Strategic Planning Sessions in Project Governance

The above graph clearly shows that efficiency-oriented and mixed initiatives score higher than growth-oriented initiatives on the Strategic Planning Sessions theme. For example, in the CRM-ENERGY case (an efficiency-oriented initiative), the front-end strategic planning process lasted two years and included the selection of a team for creating the RFPs for both the solution and the IT services, the definition of the company's new requirements and functionalities, and the selection of the consultants, IT service providers, vendors and equipment suppliers. Here is what the CIO said about this front-end process:

> *Because we wanted to ensure that we managed everything effectively, had found the best solution, we told ourselves that it was better to invest upstream in order not to be caught out downstream. This is why we took two years.*

The buyer in the PLM-AEROSPACE1 case conducted a Visioning and Scoping workshop before selecting the PLM solution and vendor. The workshop was a major mechanism that opened discussions with both internal and external stakeholders and enabled the creation of the roadmap. The mechanism also improved the vendors and consultant selection process. The following table presents excerpts for the theme in the mixed initiatives (Family 2).

Table 5-21 Excerpts for Strategic Planning Sessions in Family 2

Project	Examples from interviews
ECM-DEFENSE	- *We conducted a study of the project for a whole year before really launching it. We spent a lot of time to try to clarify what we really wanted by including everyone and we were helped by a consulting firm with the competence to enable us to formalize, to conduct the study, to structure the approach for the study.*
PLM-AEROSPACE 1	- *So at that time we decided to have a Visioning and Scoping workshop, we invited consultants from IBM and Dassault, we talked to Deloitte and CSC, we invited people from all the divisions in the company, and we had a Visioning and Scoping workshop that lasted a couple of months.* - *We identified all the problems, we looked at the overall en-to-end process, we mapped the en-to-end ASIS process, we identified all the problem areas, and we had many discussions of how to address this problem.* - *This was almost like an education and the software vendors had good consulting and good ideas of where we should go and where the technology readiness was at that point.* - *At that time when we did the Visioning and Scoping, the software vendors had a very good idea of where the PLM technology was at that point.*
BASEL II-BANK	- *An external firm conducted a study to identify the needs at the front-end and it helped us plan the project. The firm looked at the Basel requirement and the organization and identified what was needed. This culminated in a large structured portfolio of fifty initiatives.*

Additionally, the effectiveness of the workshop depended on the past relationships and accumulation of knowledge about process and integration problems. The people who were invited presented ideas about practical solutions for problems they addressed for the past ten years. Excerpts for Strategic Planning Sessions in efficiency-oriented initiatives (Family 1) are presented in the following table.

Table 5-22 Excerpts for Strategic Planning Sessions in Family 1

Project	Examples from interviews
CRM-ENERGY	- *In preliminary sessions we did an analysis to determine which one of the following scenarios we had to choose: (1) invest in the current systems, (2) buy an integrated solution if it exists, or (3) we buy a number of best-of-breed solutions that we would try to integrate. This analysis helped us really set our goals and understand what best practices we needed to develop and what processes we needed to change. This was followed by the RFP.*
ERP-FOOD	- *At the beginning we had serious acceptance and political problems. So we had to focus on clarifying the benefits of the new ERP systems for each subsidiary. This was done in the value realization phase where systematic meetings enabled us to communicate the value, return and effectiveness of the new system.*
CRM-RESORTS	- *These sessions enabled us to elaborate the strategic plan: short-term, medium-term and long-term.*

A key planning activity conducted in the front-end of efficiency-oriented initiatives is budgeting or the detailed estimation of project costs. This normative project management activity is one of the three major components of what project managers call the iron triangle (cost, delay and scope). Here is a description of the cost estimation component in one of the projects in Family 1:

> *The concept initiation phase is where you define your requirements, you get a functional and technical design, you get the architecture, etc. Usually, we have by then a solid estimate of what the cost would be.*

Here is how the respondent in the CRM-ENERGY case describes this cost estimation process:

> *So once we did it and chose the solution, and the professional services proposal, it was necessary to go to the board of directors to say look we have selected a project, this is what it is going to cost.*

The IT managers' approaches vis-à-vis project costs were very different in growth-oriented initiatives (Family 3). The CIO in the MC-OPTIC case talks clearly about the irrelevance of estimating detailed project budgets when projects are highly innovative:

> *Using the basic methodology we entrust to project control, I am trying to force people to understand that we can only work by gradually reducing ranges and that it is not about giving a particular figure.*

The table below presents some of the key excerpts in growth-oriented initiatives (Family 3):

Table 5-23 Excerpts for Strategic Planning Sessions in Family 3

Project	Examples from interviews
PLM-ENERGY	- *The consultants called it the pre-sale phase but it was more than just a pre-sales phase, it was a proof of concept. This is in reality a pilot project that lasted one year.* - *There was a philosophical problem because IBM and Dassault had to convince their client that they could go beyond cars and planes. It was a long phase where doubts about the integrated approach were addressed.*
DDS-THEME PARK	- *We closely worked with the consultants, the business, and our partners in the US in preliminary planning sessions and the consultants really helped us build the roadmap.*
MC-OPTIC	- *The first episode was to agree on the business model.* - *In these high-level and strategic planning phases, in the letter of intent, we give broad ranges and in the following stages we would gradually reduce the range.*

ii) Governance Rules & System

This theme reflects the respondents' understanding of governance and shows how compliance (as opposed to value creation) is what they associate the concept to. The theme occurred in 78% of the prototypes and accounts for 7% of all Project Governance themes. The mixed initiatives (Family 2) show the highest scores for Governance Rules & System. The theme occurred in 100% of the cases in Family 1, two-thirds of the cases in Family 2 and two two-thirds of the cases in Family 3.

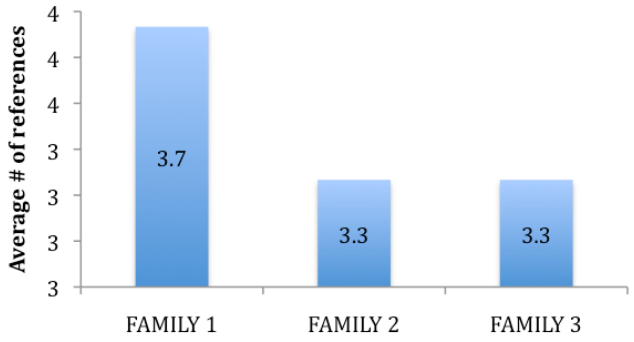

Figure 5-14 Scores for Governance Rules & System in Project Governance

As defined in the lexicon of themes (see the appendix), the Governance Rules & System theme reflects specific and well-defined governance rules structuring relationships and clearly described by respondents. The company's executive committee generally creates these explicit rules. The following two tables show excerpts for the theme in mixed (Family 2) and efficiency-oriented (Family 1) initiatives where scores are higher.

Table 5-24 Excerpts for Governance Rules & System in Family 2

Project	Examples from interviews
ECM-DEFENSE	- *The first governance rule I would say is the way the project is structured: we have a business case and clear definition of what needs to be done, iterations to present the file and obtain an acceptance, a project roadmap, an architecture, and finally the RFP document was ready.* - *My IT team does not produce anything anymore. We focus on governance, strategic choices, project management and the management of subcontractors and outsourcing contracts.*
PLM-AEROSPACE 1	- *Well we have a whole governance structure: we have an executive sponsorship committee, then we have senior management who act like stakeholders, then we have a governance committee set up with for example Dassault and IBM where we meet on a fairly regular basis to know where the project is going. Each level of the governance has a different area of responsibility or authority if you wish.*

Respondents have a harder time describing their governance system in growth-oriented initiatives because of its creative and emerging nature. In efficiency-oriented and mixed

initiatives more mature and tested governance frameworks exist and can be applied with minimum adaptation and customization.

Table 5-25 Excerpts for Governance Rules & System in Family 1

Project	Examples from interviews
ERP-FOOD	- *These are management rules like for example our IS Operating Models. This means that all projects in all our subsidiaries need to be documented in our global depository or project portfolio, etc.* - *We dissolved the business structure that was in place to manage the project and the governance of this project was transferred to me, the CIO, from the business. The old project manager was sent somewhere else.*
CRM-ENERGY	- *The governance of the initiative is about the communication and reporting processes. There's the project team, the IT team, the VP who reports to the president and the board, etc.*
CRM-RESORTS	- *We have governance rules used in our IT projects that consist of: (1) to effectively organize project teams, (2) to create frequent and quick links with the user teams, and (3) to never try to satisfy the clients without their implication and to never try to impose any system without their complete acceptance.*

Additionally, some respondents also associate governance to corporate governance systems and regulations. Here is what the CIO in the ERP-FOOD case said about the positive effect of SOX on his governance system:

> *When we reached the SOX period, it helped us considerably because suddenly by making SOX Compliant for N subsidiaries, we only had to do it once, rather than going to see each subsidiary to check whether SOX Processes had been respected. Therefore it is a considerable advantage.*

Here is an important governance rule described by the CIO in the ECM-DEFENSE case that was thoroughly applied in the ECM project:

> *Five years ago we introduced a rule which stated: when we put in place projects concerning the entire group, the budget shall be approved by group management, the strategic IT steering committee and once it is approved, it is handed over to the IT department who executes it.*

Two respondents in growth-oriented initiatives (Family 3) gave a clear account of their understanding of what a governance system is. The table below presents these descriptions:

Table 5-26 Excerpts for Governance Rules & System in Family 3

Project	Examples from interviews
MC-OPTIC	- *In such transversal and strategic projects we designate a specific sponsor who reports to the executive committee and who only focuses on the project. This was a senior manager who was previously responsible of all the labs on the French territory. So we gave it to someone very senior who has to coordinate, to report to us, and who has to make it work.* - *You see in such innovative initiatives we create an ad hoc organization.*
DDS-THEME PARK	- *We used and adapted the framework proposed by the IT Governance Institute. You need to have an IT executive committee, an IT executive board, an enterprise architecture board, a steering committee for each project, a risk management mitigation plan, etc. We adapted all these structures to make them more pragmatic and usable for us.*

iii) Funding Process

The theme reflects the importance and difficulty of the funding process. It occurred in 56% of the prototypes and accounts for 5% of all Project Governance themes. The average score for the theme in mixed initiatives (Family 2) is more than three times the average score in efficiency-oriented and growth-oriented initiatives (Families 1 and 3). The theme occurred in one-third of the cases in Family 1, 100% of the cases in Family 2 and one-third of the cases in Family 3.

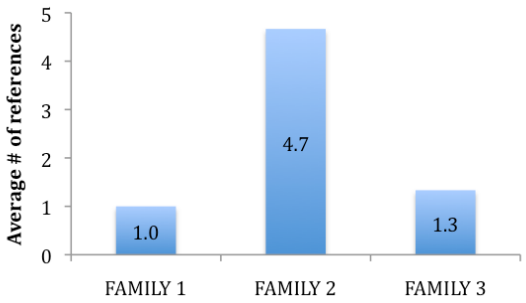

Figure 5-15 Scores for Funding Capability in Project Governance

When projects are highly innovative and exploratory (Family 3), funding is less of an issue for several reasons (also described in the excerpts below): (1) the executive committee finances the project in most cases so the costs do not affect the performance of a particular business unit, (2) projects are much smaller, and (3) suppliers are motivated to work for less because of their high stakes in the co-created innovations. Funding is also less of a challenge in efficiency-oriented initiatives because the platforms at hand (ERP, CRM, etc.) are stable and tested so buyers or suppliers can easily get approval for funds either from the business itself or from banks. Find below excerpts in mixed initiatives (Family 2) where the funding process is the most critical.

Table 5-27 Excerpts for Funding Process in Family 2

Project	Examples from interviews
ECM-DEFENSE	- *We told the bank we had a great project that we did not want to finance with our own reserves. We asked them if they were ready to finance it and gave them the file that they audited of course.*
PLM-AEROSPACE1	- *For a successful implementation of a PLM solution you also need to have the money.* - *It's more a question of distraction, people are extremely busy and money is not always available, it is of course where it's needed the most.*
BASEL II-BANK	- *What we did, last year, which is interesting […], because we had the credibility to deliver, because it was the first time that [the company] agreed to give us our budget for our next three years, I have my budget, 82.5 million, for the next three years, […]*

In mixed initiatives, the business units are very concerned with the financial impact of the project on their performance and tend to pressure IT to reduce the project costs in a very aggressive way. However, cost pressure is not a critical issue for IT when projects are very innovative and more strategic. Here is what the CIO in the ECM-DEFENSE case said about the cost pressure coming from business units:

> *We ask you to ensure that through design, through negotiation with suppliers, through operating architectures […] you eliminate said supplementary costs, these calculations, to bring us below a certain cost.*

Another major funding factor advanced by respondents in mixed initiatives is the importance of building a track record of high performance in delivering IT projects. In the words of one of the respondents:

> *What we've been able to do to convince the business to give us the money is: we've got a track record with the business now bringing solution very cost effectively so the business likes it, and a long-term implementation for me is a year, so I want to deliver functionality to the business that the business values, within twelve months.*

This excerpt also demonstrates the strong connection between the funding capability, modularity and the delivery capability. Business managers and executives need to constantly feel the value created and this is only possible if the project is modularized in smaller chunks that independently solve problems and create value. Here is what the respondent in the BASEL II-BANK case said about the impact of a strong track record on the funding capability:

What we did, last year, which is interesting, because we had the credibility to deliver, because it was the first time that [the company] agreed to give us our budget for our next three years, I have my budget, 82.5 million, for the next three years.

Table 5-28 Excerpts for Funding Process in Family 3 and Family 1

Project	Examples from interviews
MC-OPTIC	- *Very often, the head office finances the investments needed by these strategic projects.* - *The green light is given by the head office and the budget is not a priority.*
CRM-ENERGY	- *The difference between our organization and a private company is that we have one shareholder, the Quebec government, who has money.*

In sum, the major funding issues found are: (1) the ability to calculate the ROI of the project, (2) obtaining bank loans, (3) cost pressures from business units, (4) sharing the front-end development costs with consultants or vendors, (5) the ability to negotiate on-demand or premium payment methods with suppliers, (6) the CIO's track record and reputation in executive circles, and (7) IT's ability to deliver functionality on the short or medium term.

iv) PMO (Project Management Office) Role & Nature

The theme occurred in 56% of the prototypes and accounts for 4% of all Project Governance themes. The research results show that the PMO Role & Nature theme is less important in growth-oriented initiatives (Family 3). Also, the theme occurred in two-thirds of the cases in Family 1, one-third in Family 2 and two-thirds in Family 3.

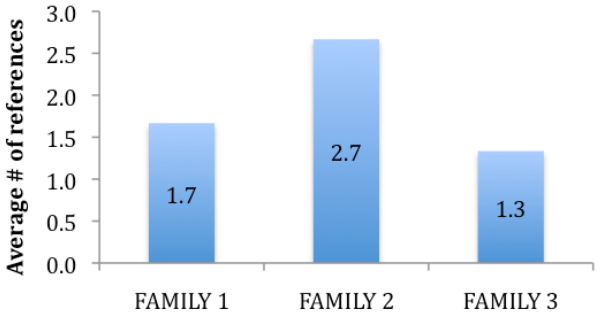

Figure 5-16 Scores for PMO Roles & Nature in Project Governance

The results show that project management remains an important success factor in growth-oriented IT initiatives but instead of being conducted from a Project Management Office (PMO), the critical function is more often controlled by the CIO inside the IT function in partnership with either an internal business manager appointed by the company's top executives or an external project management expert.

Table 5-29 Excerpts for PMO Role & Nature in Family 2

Project	Examples from interviews
BASEL II-BANK	- *Our role is not limited to managing the technology. We manage change, communication, information, we describe the new processes, we manage labor, etc. So we manage everything including the relationships with our suppliers.* - *We changed the PMO completely and you would have the impression to be in a totally different world now. The technical and financial language used in the PMO was transformed and adapted to improve the communication with the rest of the business.*

Mixed initiatives (Family 2) show higher scores in PMO Role & Nature because of the nature of the companies involved and because of the large portfolio of IT projects they address. In the BASEL II-BANK case for instance, the project portfolio, modularity and scope are defined and managed in the PMO, not in the CIO's office. A critical success factor was the creation of a new and effective jargon in the PMO to enhance the communication between business units, consultants and the IT team. There are some exceptions in mixed initiatives. One of the CIOs managed a large portfolio of parallel projects without using any PMO. In his own words:

It's kind of ironic; we don't have an independent Project Management Office.

Table 5-30 Excerpts for PMO Role & Nature in Family 1

Project	Examples from interviews
CRM-ENERGY	- *We hired a small firm here in Quebec called R3D for the project management aspect, the PMO.*
CRM-RESORTS	- *If I need a project manager it is in my best interest to hire him the consulting partner we are already dealing because he has the competence and knows the subject and our products. But also because I already negotiated and could get a good bargain.* - *This is a PMO so we manage competencies, we manage sourcing, we manage finance, etc. These are business activities if you want so we manage the IT function like a business or separate entity.*

In most initiatives, the project sponsor (leader) is someone appointed from the business function and who reports to his function's VP, and the formal project manager is an external expert who is held accountable for the delivery process.

Table 5-31 Excerpts for PMO Role & Nature in Family 3

Project	Examples from interviews
MC-OPTIC	- *The project manager who is appointed by the executive committee makes his own choices and decisions.* - *The project profitability or ROI is the responsibility of the appointed project manager.*
PLM-ENERGY	- *We hired someone from CDS, a small firm that specializes in project management and engineering consulting who helped us define the problem. He is a mechanical engineer who worked several years with Michelin and who has been the project manager with us for the past three years.*

Although project managers are often hired in growth-oriented initiatives, there is a tendency to keep in the IT function a lot of the project activities that would normally be in the PMO. The CIO overlooks and manages the portfolio of projects, structures the front-end exploratory phase but delegates the day-to-day project management responsibilities and implementation either to internal business managers or to external experts or specialists in project management. Finally, the maintenance of an internal Project Management Office is no longer appealing to many CIOs and senior managers.

v) Trust & Transparency

The theme occurred in 56% of the prototypes and accounts for 3% of all Project Governance themes. This theme is weak because of its intangible and intuitive nature. Trust, transparency and respect were mentioned by respondents but were not elaborated and detailed. The following graph shows the general low frequency of the theme:

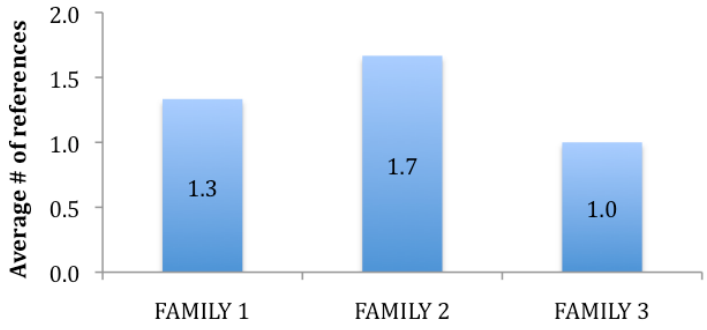

Figure 5-17 Scores for Trust & Transparency in Project Governance

Trust & Transparency is closely interconnected to Project Governance themes like Funding Process, to Intra-Organizational Governance themes like Business-Technology Partnerships and

to Inter-Organizational Governance themes like Partner Selection Process, Partnerships and Personal & Social Contacts. Strong trust relationships have the ability to counterbalance the destabilizing forces in highly innovative projects. The dynamic is well described by the CIO in the ECM-DEFENSE case:

> *Innovation, or change, can be seen as a danger by both parties and above all by the client because by definition it will destabilize the contract, contract content, etc. Therefore it is only possible to introduce such elements of change and innovation when there is confidence.*

The excerpts below reflect the way respondents in all project families believe in the necessity for stronger trust relationships, partnerships (internal and external) and transparency when innovation and uncertainty increase.

Table 5-32 Excerpts for Trust & Transparency in Family 2

Project	Examples from interviews
ECM-DEFENSE	- *In mature relationships where people trust each other we still use contracts but we do not refer to these contracts every day because we've attained a controlled mode where things go well and where people respect each other. This can be summarized in three words: (1) respect, (2) trust, and (3) transparency.*
CM-INSURANCE	- *We've got a track record with the business now bringing solution very cost effectively so the business likes it.*

Various types of trust and transparency relationships were mentioned. The internal relationship between IT and the business managers and the external relationships between IT and the consultants and vendors were equally mentioned.

Table 5-33 Excerpts for Trust & Transparency in Family 1 and Family 3

Project	Examples from interviews
CRM-ENERGY	- *We want to be precise, transparent and fluid everywhere in everything we do.* - *The notion is: no hidden things and no questions not asked. This is our management philosophy.*
CRM-RESORTS	- *The goal is to give them visibility every three months. This psychologically reassures the business people because they see that you keep your promises and can trust you in return.*
DDS-THEME PARK	- *I think that trust is a major factor.* - *I also think that transparency and the demonstration of the value added are crucial.*

According to the CIO in the ECM-DEFENSE case, (1) trust, (2) respect, and (3) transparency are major prerequisites for co-innovation in IT initiatives. These factors are much weaker if the

consultants and vendors in the project are hired for the first time. Another interesting trust-related topic advanced by one of the respondents in growth-oriented initiatives (Family 3) is the role and importance of culture and language in communicating vision and roadmaps in innovative projects. Here is what was said:

> *I organized a meeting between the number 2 at the company and the number 2 at Dassault and during the meeting, culture and language really facilitated the exchange of visions.*

Internal trust and transparency on the other hand are critical and directly linked to the CIO's capacity to continuously deliver new functionality to the business. IT managers who have a strong track record in regards to keeping their promises are more likely to enter in a co-innovation relationship with business managers. As previously mentioned, these managers also have stronger relationships with top executives and can easily unlock funds for more innovative and larger projects. The positive track record of all stakeholders in the value chain, their transparency and their cultural affinities create an atmosphere of trust that enables decision-makers to engage in more innovative and more strategic IT initiatives.

5.1.2 Secondary Project Governance themes

Three secondary Project Governance themes were extracted from the core model through the qualitative analysis process: (1) Delivery Process (Capability), (2) Function & BOB Approach, and (3) Joint Activities. This table shows where and to what extent each secondary theme occurred in the sample:

Table 5-34 Scores of secondary themes in Project Governance

Project Governance (secondary themes)	1: CRM - ENERGY	2: CRM - RESORTS	3: ERP - FOOD	4: BASEL II - BANK	5: ECM - DEFENSE	6: PLM - AEROSPACE1	7: DDS – THEME PARK	8: MC - OPTIC	9: PLM - ENERGY	**TOTAL**	**% OF CASES COVERED**
1: Delivery Process	0	5	0	3	0	0	3	0	0	11	33%
2: Function & BOB Approach	0	0	0	8	1	0	2	0	0	11	33%
3: Joint Activities	0	0	0	0	0	0	1	0	6	7	22%
TOTAL	**0**	**5**	**0**	**11**	**1**	**0**	**6**	**0**	**6**	29	**56%**

The graph below shows the results for the secondary Project Governance themes:

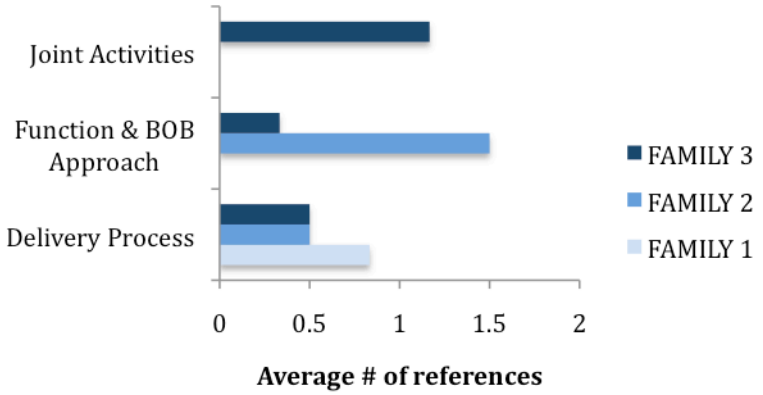

Figure 5-18 Scores of secondary Project Governance themes

While Delivery Process is stronger in efficiency-oriented initiatives than growth-oriented initiatives, Function & BOB Approach is stronger in mixed initiatives and Joint Activities only occurred in growth-oriented initiatives (Family 3). The delivery capability is emphasized in efficiency-oriented initiatives because of the size of these projects and the risks associated to long delays of large modules that could de-motivate business managers and team members and cause projects to escalate negatively. The Function & BOB Approach was highly adopted in mixed initiatives (Family 2), barely adopted in growth-oriented initiatives (Family 3) and not adopted at all in efficiency-oriented initiatives (Family 1). Here is what the respondent in the BASEL II-BANK case said about her adoption of the Function & BOB Approach:

> *One month before I arrived, all the suppliers called me because they knew that I was coming and they wanted to convince me to take a « data » approach instead of a « functions » approach but I never wanted to.*

Finally, Joint Activities was used to code descriptions of very specific design activities conducted jointly by the IT team and external experts and consultants. This secondary theme is only found in growth-oriented initiatives (Family 3) and gives a good account of the uniqueness and importance of collaborative design activities conducted in highly innovative IT projects with the exception of the MC-OPTIC project.

5.2 INTRA-ORGANIZATIONAL GOVERNANCE AND INNOVATION

In the research model, Intra-Organizational Governance scores are lower than both Project Governance and Inter-Organizational Governance. These scores reflect the overall intensity and importance of the themes for the respondents. The overall scores for the Intra-Organizational category are at 284 as opposed to 423 and 428 for Project Governance and Inter-Organizational Governance respectively.

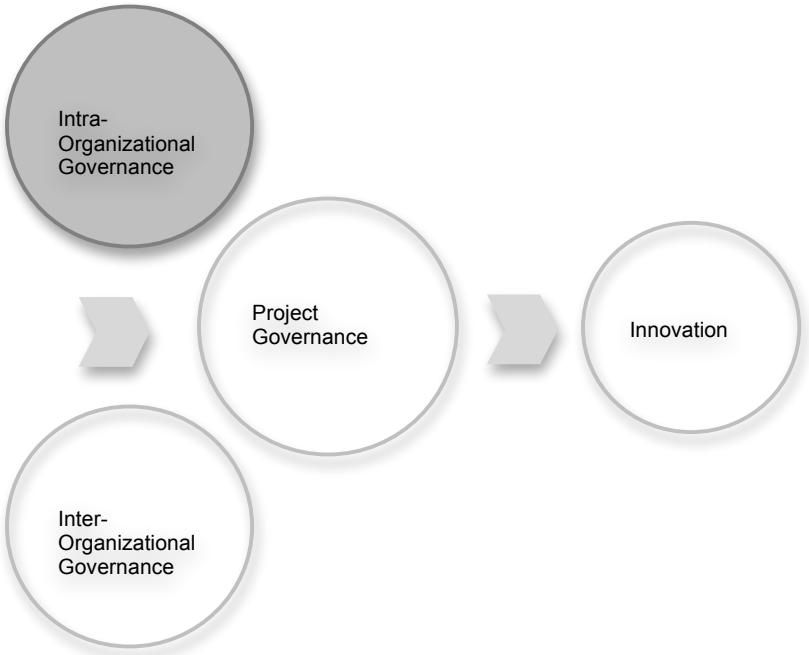

Figure 5-19 The Intra-Organizational Governance block

5.2.1 Primary Intra-Organizational Governance themes

At the end of the 7th iteration in the qualitative coding process (chapter 3), 8 primary themes in the Intra-Organizational Governance block emerged. These primary themes are presented in two parts: (1) key themes for growth-oriented initiatives, and (2) key themes for efficiency-oriented initiatives. The table below shows the scores obtained for every intra-organizational governance theme in every one of the nine prototypes (three in each family).

Table 5-35 Scores of all primary themes in Intra-Organizational Governance

Intra-Organizational Governance (primary themes)	1: CRM - ENERGY	2: CRM - RESORTS	3: ERP - FOOD	4: BASEL II - BANK	5: ECM - DEFENSE	6: PLM - AEROSPACE1	7: DDS – THEME PARK	8: MC - OPTIC	9: PLM - ENERGY	**TOTAL**	**AVERAGE FREQUENCY IN ALL CASES**	**% OF CASES COVERED**
1: Change Management	5	2	9	6	3	2	5	8	16	**56**	**6.22**	**100%**
2: Internal Business Support & Roles	4	4	4	2	8	5	2	14	6	**49**	**5.44**	**100%**
3: Internal Demand	3	3	4	7	7	6	6	2	4	**42**	**4.67**	**100%**
4: IT Roles and Competences	5	14	16	3	12	0	4	10	5	**69**	**7.67**	**89%**
5: Business-Technology Partnership	0	2	0	0	3	1	3	5	1	**15**	**1.67**	**67%**
6: Internal Team Selection Process	1	0	1	4	1	0	2	3	0	**12**	**1.33**	**67%**
7: New Capabilities & Learning	0	5	4	0	3	0	6	3	0	**21**	**2.33**	**56%**
8: Shared IT Support	3	4	9	0	0	0	2	1	0	**19**	**2.11**	**56%**
TOTAL	**21**	**34**	**47**	**22**	**37**	**14**	**30**	**46**	**32**	**283**	**31.44**	**100%**

On average, Intra-Organizational Governance occurred 31.4 times in every prototype and the ERP-FOOD and MC-OPTIC cases showed the highest scores with 47 and 46 occurrences respectively. The following chart illustrates the relative significance of Intra-Organizational Governance themes with IT Roles & Competences being the most frequent primary theme and Shared IT Support being the least quoted primary theme.

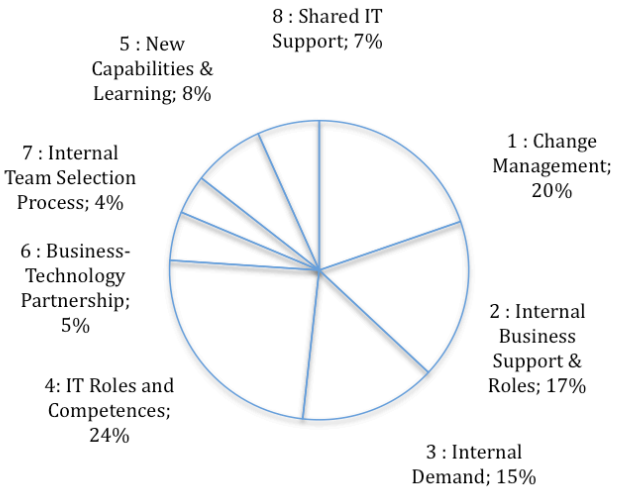

Figure 5-20 Relative importance of all themes in Intra-Organizational Governance

Even though IT Roles & Competences occurred more frequently over the whole sample, it was placed after Change Management, Internal Business Support & Roles and Internal Demand because it occurred only in 89% of the cases as opposed to 100% for the other themes. The graph below shows the average scores for intra-organizational governance in each family:

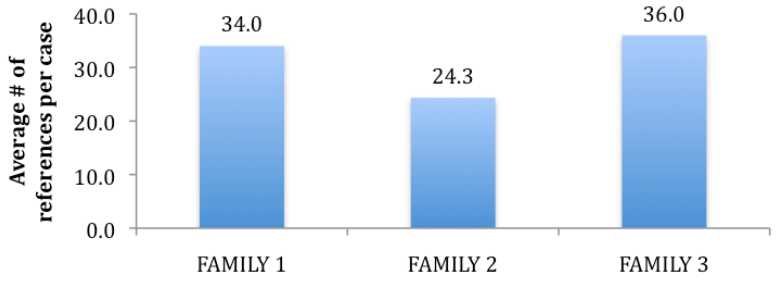

Figure 5-21 Average Intra-Organizational Governance scores per family of initiatives

A priori, the case coverage and theme density graphs (below) show a low quantitative variability over project families. Nevertheless, the percentage of themes that occurred at least once in growth-oriented initiatives (Family 3) is higher.

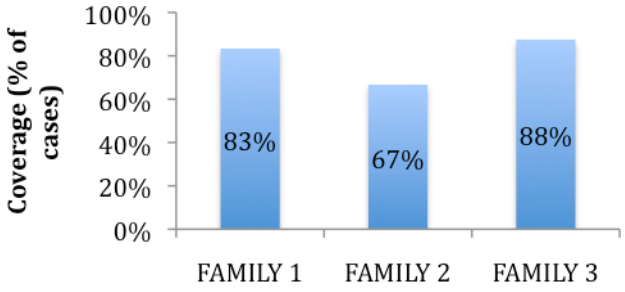

Figure 5-22 Average coverage of cases with intra-organizational governance

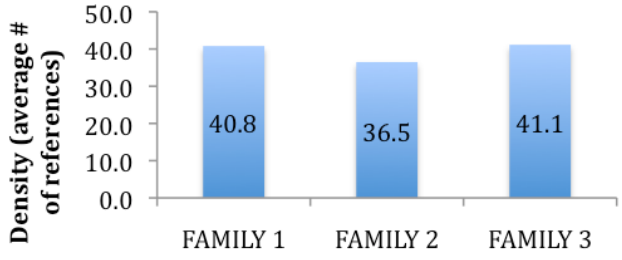

Figure 5-23 Average density of cases with intra-organizational governance

The scores of the eight primary Intra-Organizational Governance themes for each one of the three project families are presented in the following chart:

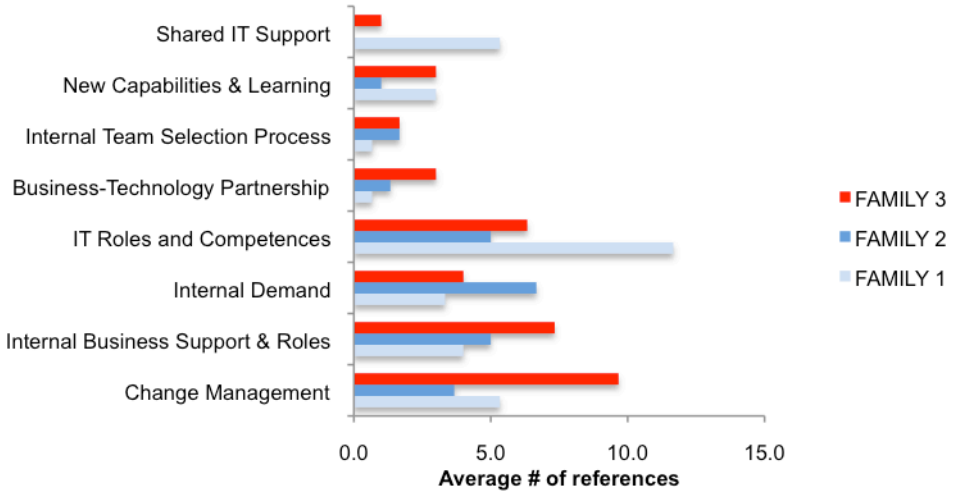

Figure 5-24 Scores of primary themes in Intra-Organizational Governance

Key Intra-Organizational Governance themes in growth-oriented initiatives

As seen in the above chart, the key themes in growth-oriented initiatives (Family 3) are (1) Change Management, (2) Internal Business Support & Roles, (3) Internal Demand, (4) Business-Technology Partnerships, and (5) Internal Team Selection Process, and (6) New Capabilities & Learning. These six themes are all stronger in growth-oriented initiatives as opposed to efficiency-oriented initiatives. Even though Internal Demand showed higher scores in mixed initiatives, the theme is generally more oriented towards innovation than efficiency; its innovation component is stronger than its efficiency component.

i) Change Management

Change Management is a mechanism used to address resistance to change on all organizational levels. The theme occurred in 100% of the prototypes and accounts for 20% of all Intra-Organizational Governance themes. Most references to Change Management were found in growth-oriented initiatives (Family 3). The graph below shows how Change Management occurred more frequently in Family 3:

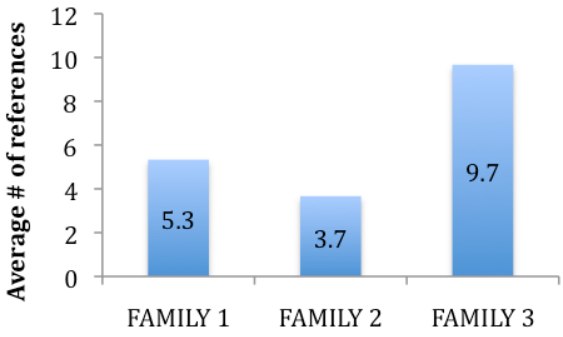

Figure 5-25 Scores for Change Management in Intra-Organizational Governance

Growth-oriented initiatives (Family 3) show strong resistance and conflicts at higher levels because of the change of philosophies and business strategies they imply. In contrast, efficiency-oriented initiatives (Family 1) show resistance on a lower level because of the way the new systems affect the business processes and work habits. There's a strong relation between Change Management and Internal Demand in innovative-oriented initiatives. In the PLM-AEROSPACE1 case for instance (Family 2), the respondents were generally satisfied with the PLM project but the main problem according to them was the buy-in, acceptance or recognition of the project gains at all levels (senior and mid-level management). According to one of the respondents in the case, the gains are strongly linked to process productivity improvements and organizational changes and until these transformations are completely done in the different departments (or silos), the PLM benefits and capabilities will not fully materialize.

The table below presents excerpts for Change Management in growth-oriented initiatives (Family 3) where integration challenges are combined with initial higher-level strategic issues and misunderstandings that create stronger resistance to change and slow the innovation process. According to one of the respondents in the EHR-HEALTH case, Change Management was the major challenge in the project because medical doctors had to change and adapt their practices and work habits. Here is a good quote:

> *The big challenge in these sorts of projects is implementation and the management of change. I am referring to the 300 doctors who are used to leaving with their files under their arm then sitting on the patient's bed and looking through his case history file, he will no longer be able to do that.*

Table 5-36 Excerpts for Change Management in Family 3

Project	Examples from interviews
PLM-ENERGY	- *We engaged in several meetings, formal and informal, to present and demonstrate the advantages to the business before they accepted to embark. It probably took six months.* - *The second phase is probably the most critical because it doesn't mean that because you sold it that people in the business really bought the technology. The importance after the legal contracts were signed was to make sure that people really used the technology.*
MC-OPTIC	- *This was another type of internal resistance. Our small competitors can afford making lenses of average quality with not much customization but this is not acceptable for our company.*
DDS-THEME PARK	- *So we contract solutions and we manage the acceptance process. In other words, we manage change.* - *Change management is essential. For example, we had to manage the change with regards to the tasks and functions of my IT Help Desk. The duration of calls was extended because instead of asking them to solve the clients' issues in two minutes, we asked them to solve 70% of the incidents.*

The MC-OPTIC case is a good example of how growth-oriented initiatives create conflicts and resistance over the new business case because of the risky strategic renewals the IT project triggers. Here is what the CIO said about this challenge:

> *There are two sorts of resistance to change: the first - saying we are going to kill our business unit, facilitating access to this kind of new technologies involves taking crazy risks, in so doing you will kill the very thing that made your company's fortune. Therefore this is the first type of resistance offered by the markets.*

Here is what the CIO also said about the misunderstandings that this higher-level resistance to change creates amongst business executives:

> *Getting all these people to agree on a business model is complicated.*

The CIO in the DDS-THEME PARK case explains how his DDS project transformed the jobs of lower level employees after the company decided to strategically transform its sales and marketing channels from BtoB to BtoC. Here is what he said:

> *Therefore in terms of management of change, for example, time, call time will be longer, if I take an example from the IT Hot Line or my IT Help Desk, in terms of time we asked*

them to answer in two minutes, which is idiotic, I told them, I want you to resolve 70% of incidents at your level […].

Many cases show a strong link between Change Management and the Role of External Partners and Vendors. In the PLM-AEROSPACE1 case for instance (Family 2), the vendors and consultants played a critical role in providing the buyer with change management frameworks during their consulting mandates in the Visioning and Scoping workshop. They started evaluating the company's readiness every quarter on three levels: (1) technology, (2) organization, and (3) business.

Table 5-37 Excerpts for Change Management in Family 2

Project	Examples from interviews
BASEL II-BANK	- *Exactly. So we completely transformed the Sword of Damocles of Basel to some sort of a social phenomenon in which people adopted the new ways of doing things because they were convinced that the changes were beneficial for the business. This was a major change.* - *Because we changed a lot of the ways things are done, we had to involve all the levels in the business, employees, managers, etc. Everyone was affected overnight.*
ECM-DEFENSE	- *One of our business units asked for a new document management system during the project but we told them look, you are already using the system that every unit and department uses in the company and even though it might not be the best in the world it works well so why change it? But we ended up accepting and we told them since you're the only ones using that service, we will simplify it and you will have to pay for it.*
PLM-AEROSPACE1	- *You have to have the technology readiness, the organization readiness, the business readiness, and you have to look at it quarterly. When the software vendor senses that this readiness is not there, they feel very uncomfortable in sharing the risk.*

An important issue seen in mixed and efficiency-oriented initiatives (but not seen in growth-oriented initiatives) is the resistance to centralization and standardization efforts conducted in concert with the large ECM, ERP and CRM projects. Here is what the CIO in the ECM-DEFENSE case said about the resistance to centralization:

Five years ago IT was completely decentralized and I was asked to centralize it, unify solutions, etc. In the process, which had already lasted five years, in the early years we made mistakes, on certain projects we were able to move more quickly as not all the structure was ready.

In general, more of the change management issues related to centralization and business integration are seen in efficiency-oriented initiatives.

Table 5-38 Excerpts for Change Management in Family 1

Project	Examples from interviews
ERP-FOOD	- *In order for the business to accept the project we almost had to force it. Two board members, the VP and number 2 in the group and one of the seven members of the executive committee had to stand on the table to push the project.* - *At the beginning things went really wrong and negotiations were difficult with the business because managers rejected the new processes defined in the core model.* - *You also have to realize that it was really hard politically because when I began I had no legitimacy.*
CRM-ENERGY	- *We are talking about 6000 employees being affected by the project.* - *Instead of focusing on resistance, you have to give levers. So we did what we call a Lever-Resistance analysis in every unit and we said ok in your case here are the levers. If you can anticipate the type of resistance you can determine what can help the unit and how to go about it.*
CRM-RESORTS	- *The challenge is to work with the internal clients instead of against them. The problem is that, too often, the IT people think they know better than the internal users. What is even more complicated is that the IT people are often right but they do not know how to collaborate and work in partnership with the business people.*

The resistance to centralization was a major challenge in companies where a culture of decentralization dominated. This was particularly the case in the ERP-FOOD case. Efficiency-oriented initiatives are characterized by a second level resistance; coming from the lower (but larger) organizational levels. In the CRM-ENERGY case for instance, 6000 employees were directly affected by the project.

iii) Internal Business Support & Roles

This intra-organizational mechanism describes the structures and rules used by senior IT managers to obtain a desirable involvement and an active support from business managers and corporate managers. The theme occurred in 100% of the prototypes and accounts for 15% of all Intra-Organizational Governance themes. Growth-oriented initiatives show the highest scores with 7.3 references on average.

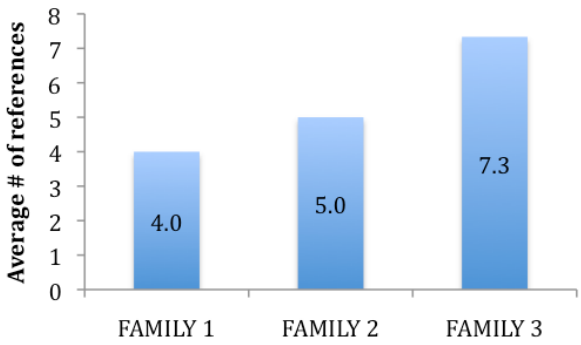

Figure 5-26 Scores for Internal Business Support in Intra-Organizational Governance

The theme is split in two sub-themes: (1) Business Managers Role and (2) Corporate Strategy Role. The excerpts below show how critical it is in growth-oriented initiatives for business managers to get involved early in the project, to understand the functionality needed, to take charge of the project and make the important decisions, and to use their influence and credibility to accelerate the adoption process.

In the DDS-THEME PARK case for instance the project's first members were internal sponsors in the Sales and Distribution division. Revenue Management was the first specific sponsor inside Sales and Distribution and the department's leader worked closely with the CIO from the beginning to grow the team, increase internal demand for the project and multiply the number of internal sponsors. The role of business managers is strongly linked to the internal demand for the innovative IT initiatives (seen earlier).

Table 5-39 Excerpts for Business Managers Role in Family 3

Project	Examples from interviews
PLM-ENERGY	- *They took the head of the Equipment division and told him this is your new project, we will give you a team and you have to find a new 3D system for the coming 20 years, the same way we found a system when we started in the 2D.* - *They created a team of 3 people with the mockup designer to make sure the project would work.* - *The project sponsor is really the project's main success factor.*
MC-OPTIC	- *The newly created division called Optic Computing System is currently 2% of the business. However, 98% of the business, which is traditional, needs these optic computing services. The doctor or optician needs the system to design the new custom-made lenses for his patients.* - *The system's functionality is the user's responsibility.*
DDS-THEME PARK	- *The business people are involved and make decisions. For example they can propose to eliminate certain business rules or remove a particular functionality from the scope, etc.* - *When business sponsors understand, decide and influence we respect them more.*

The results show that the Business Managers Role is more important in mixed initiatives than growth-oriented initiatives. However, the Corporate Strategy Role is more important in growth-oriented initiatives than mixed initiatives. The respondent in the BASEL II-BANK case for example describes the necessity to transfer the ownership of projects to business managers:

> *We allowed them to be stakeholders in the solution, not just follow it, therefore we turned the projects round, which involved me managing the entire program for the whole unit, I decentralized nearly 40% of the projects in units with accountability of delivery.*

The table below presents excerpts for Business Managers Role in Family 2:

Table 5-40 Excerpts for Business Managers Role in Family 2

Project	Examples from interviews
ECM-DEFENSE	- *There is a difference between software-based projects and projects where the software component is smaller. You need more involvement from the business in software projects as opposed to infrastructure projects.* - *However some questions asked by the business people in the decision-making process did not make a lot of sense and reflected a lack of understanding.*
PLM-AEROSPACE1	- *The way we have done it over the years: is you rely a lot on your experienced people who have seen the problems over the years in the company, take their recommendations and have them move forward. Then you develop networks with different companies, software providers etc., but I think that most consulting comes from internal people.* - *Now, how well that works depends on how busy the company is, now we're extremely busy, our sales are through the roof, so to get people's attention off the production of engines is difficult.*
BASEL II-BANK	- *The key to success was to get everyone's vision and to make managers accountable in the business.*

Excerpts for Business Managers Role in Family 1 are presented below:

Table 5-41 Excerpts for Business Managers Role in Family 1

Project	Examples from interviews
CRM-RESORTS	- *The steering committee includes the clients, the business managers. I absolutely want the client to own the project and it is not easy because they do not necessarily have a lot of time and they are dispersed around the world. But is they do not own the project, what would they do then?*
ERP-FOOD	- *We made sure our team was extremely representative of the business so we gave the project to a general manager that was not the CIO but instead a business manager who would be dedicated to the project.*
CRM-ENERGY	- *The business manager's ownership and internalization of the project, taking responsibility.*

IT managers act in certain ways to create the internal demand for new IT applications and capabilities (seen earlier) and apply certain rules for controlling this internal involvement of business users in IT projects. Here is what one of the respondents in Family 2 said about the active involvement of business managers:

This active involvement helps the business get what they want and it also helps us deliver what they want.

The internal active involvement is thus critical for innovation and value creation; it enables IT to build the functionality in the tools that the business really needs. However, those who sponsor change and innovation through IT are often the busiest. This interesting dilemma was observed in several cases. These cases demonstrate that when the business is doing well and demand is high, the project team and the IT department need to work harder to get the attention of future users to obtain their feedback, reengineer their work processes, train them, and prepare them for change. This was clearly the case in the PLM-AEROSPACE1 case.

In the PLM-AEROSPACE1 case, difficulties in the project increased when the company had a sudden increase in its engine orders, which shifted the attention of business managers even more. According to the respondents, people had difficulty keeping up with the accelerations in business operations and orders and had very limited time for new IT initiatives. Similarly, in the CRM-RESORTS case, the CIO highlights the challenge to buy the attention and participation of business people for the same reason: limited time to spend on IT projects. Another factor introduced in this case is the geographical scattering of business people involved, which makes their participation and their leadership harder to achieve.

The PLM-AEROSPACE1 case showed how difficult it becomes to effectively run a governance system for IT projects like the PLM project when business managers and executives are too busy with their ongoing operations. This justifies the importance of having stronger governance mechanisms in place and a stronger IT leadership.

While the active involvement of business users and middle management is critical for the success of IT initiatives, the results show that the support of senior management (or corporate strategy) is more critical in growth-oriented initiatives (Family 3). The tables below present excerpts for the Corporate Strategy Role in the three families.

Table 5-42 Excerpts for Corporate Strategy Role in Family 3

Project	Examples from interviews
MC-OPTIC	- *These projects are the responsibility of the general management and the corporate team of the company because we do not want to disrupt the results of the business units. Because each unit has a bonus that depends on its business performance and its charges and projects.*
PLM-ENERGY	- *All executives, the client and business executives as well as the IT executives were engaged.*

The CIO in the MC-OPTIC case explains how highly strategic and innovative initiatives (Family 3) are sponsored and managed by corporate strategy (the executive committee) as opposed to business units or functions. Here is part of what he said:

> *When we do things like that, strategic projects, it is the executive committee directly which grants power to a senior who will act as project manager. When a project of this nature starts, no one wants to take charge.*

Table 5-43 Excerpts for Corporate Strategy Role in Family 2 and Family 1

Project	Examples from interviews
ECM-DEFENSE	- *I would like to remind you that the representatives of the top management are involved from the beginning. We actually asked the top management to designate and choose the participants.*
ERP-FOOD	- *In order for the business to accept the project we almost had to force it. Two board members, the VP and number 2 in the group and one of the seven members of the executive committee had to stand on the table to push the project.*
CRM-ENERGY	- *The top management and the VP of Sales and Customer Service had to constantly feed the company's strategic plan to achieve a variety of things.* - *There was a good stability inside the project team, but outside the core team, in the past four years, the chairman of the board, the division's president and the VP of Sales changed.*

Efficiency-oriented initiatives score as high as growth-oriented initiatives on the Corporate Strategy Role because they entail major business process transformations and risks of destabilizing mission critical business operations. In the CRM-POST case, the CIO highlights the importance of putting the project on the president's agenda:

> *One thing that enabled us to make sure it would be a success was the fact that the project was on the president's agenda.*

iii) Internal Demand

The role Internal Demand plays in innovative IT initiatives is a critical observation in this research. The CIO's ability to create the internal demand for IT-driven innovations seems to be a key determinant for innovation. The theme occurred in 100% of the prototypes and accounts for 15% of all Intra-Organizational Governance themes. The graph below shows the average number of references of the theme in each family:

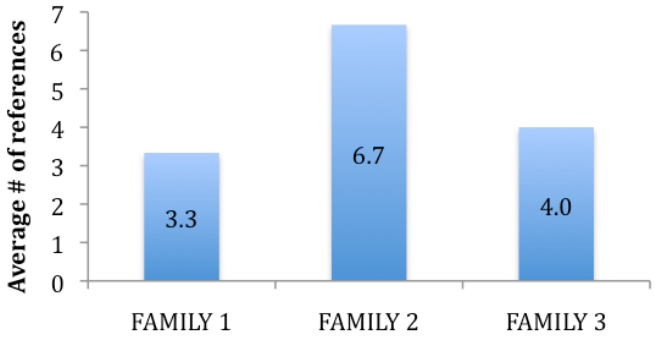

Figure 5-27 Scores for Internal Demand in Intra-Organizational Governance

In theory, Internal Demand could have been combined to Change Management but the qualitative analysis process unveiled new knowledge combining two Internal Demand concepts: (1) Creating Demand & Vision, and (2) Selecting Business Innovations. The table below shows that the first Internal Demand concept is by far more frequently brought up than the second concept. The first concept is mentioned in 100% of the cases as opposed to 50% for the second concept.

The IT managers interviewed in mixed and growth-oriented initiatives all had the ability, position and motivation to create a vision and an internal demand for innovative IT solutions that rejuvenate business strategy and create an enormous amount of value for the business.

The theme is a powerful indicator of the recent shift in the role, position and skills of the IT manager. See excerpts in Family 3 in the following table:

Table 5-44 Excerpts for Creating Demand & Vision in Family 3

Project	Examples from interviews
PLM-ENERGY	- *We are continuously wining the battle with the business and every day people in the business are impressed with the functionalities and the user-friendliness of the new system.* - *The business people were convinced but after we convinced them I remember they told us: now we have suppliers to convince, how can you help us convince the senior managers at SNC, Tecsult, etc.?*
DDS-THEME PARK	- *We started the project with one business sponsor in the company's Revenue Management department but we carried on and recruited more sponsors. Although we are just the IT leaders in the business we actively recruited new sponsors to help us convince the various areas in the business, namely the head of Sales.*
MC-OPTIC	- *My position in this initiative was clear. I said let us not become another Kodak, let us not miss the digital miracle and let us be the leaders. These are really critical discussions.*

The major approaches used by IT managers in growth-oriented and mixed initiatives, to create the internal demand and vision, are (1) quickly recruiting business people who can influence, (2) educating decision-makers and users on all levels, (3) communicating effectively the IT vision and roadmap, and the business benefits associated with the project.

The respondents in growth-oriented and mixed initiatives worked harder to get the buy-in for their IT initiatives. They emphasize the challenge of creating the buy-in and internal excitement. In certain cases, the buy-in challenge increased because the company was going through a fast growth phase that kept its business people really busy. The PLM-AEROSPACE1 case is a good example:

> *Keeping the excitement in the business: the buy-in from the business because many things change. Right now for example everybody is very busy developing engines.*

Another challenge is the scale of the platform and the number of people, functions and business units it impacts. The ECM-DEFENSE case is a good example; here is what the CIO said about the scale challenge in the buy-in process:

> *The buy-in process is of key importance in this approach, getting everyone on board with the project. Because the group is a large group, present in quite a few countries, with an organizational structure based on operational units which is therefore divided into six*

large divisions, in six large countries, later we will be present in 70 countries, ten thousand people in the group, hundreds of legal entities, etc.

The scale challenge is more of an issue in mixed and efficiency-oriented initiatives. Excerpts for Creating Demand & Vision in Family 2 are presented in the following table:

Table 5-45 Excerpts for Creating Demand & Vision in Family 2

Project	Examples from interviews
BASEL II-BANK	- *What really created the internal vision and interest for the project is the way we explained the reasons behind the project and the value it would create for the business.* - *We presented the initiative as a support to business development and this was a winning strategy.*
ECM-DEFENSE	- *The commitment we got from the business units in using the new system was key.* - *For a period of time, the directors of operations did not understand the need for the new system but in one of our meeting I convinced them by showing them how the demand for such innovative systems is increasing with the departure of the baby boomer generation and the significant recruitment of younger employees who are more familiar with the new technologies and who need them in their everyday work.*
PLM-AEROSPACE1	- *For a successful implementation of a PLM solution, you have to have the buy-in from all the Business Units you have to have a strong buy-in from the executives.* - *Keeping the excitement in the business, the buy-in from the business because many things change; right now for example everybody is very busy developing engines.*

The theme (Creating Demand & Vision) reflects the strategies used to create an IT vision and a demand for innovative IT systems inside the business. In mixed and efficiency-oriented projects, the strategies had to address the scale challenge (not present in Innovation Initiatives). IT managers used Modularity (described in Project Governance) to address scale and to systematically deliver functionality to the business. Here is what one of the respondents in Family 2 said about the relationship between Modularity and internal buy-in:

A long-term implementation for me is a year, so I want to deliver functionality to the business that the business values, within 12 months. So we do phasing and things like that and we deliver to the business so the business goes "Oh god I love that! Keep going."

Another strategy used to convince the senior managers was to highlight the IT needs of younger associates and the importance of giving them the modern tools (personal productivity and collaboration) they were expecting to use in their jobs. There's often a large gap between the technology needs (and skills) of senior managers and that of younger associates. The CIO has a

critical role in bridging that gap especially when growth needs are combined with massive departures of baby boomers. The following table shows excerpts for the theme in Family 1.

Table 5-46 Excerpts for Creating Demand & Vision in Family 1

Project	Examples from interviews
ERP-FOOD	- *What was done really well was the way the idea of accepting the implementation of an ERP and the migration from a decentralized logic to a centralized logic was sold to the group.* - *I went to the board of directors and told them we had to freeze the project, to freeze a certain number of deployments because we had to completely review a number of fundamentals first.*
CRM-ENERGY	- *The objective is our mission, to satisfy our clients. What we do has to be legitimate and has to make sense to the business and to all employees.* - *Today, not a single employee is saying I want to go back to the old system.*
CRM-RESORTS	- *When you regularly deliver things, you secure your relationship with the business people and they become in a position where they see things improve and change. When they see improvements and things delivered regularly they are willing to wait longer for the project to finish.*

Internal Demand (buy-in) is a function of the IT team's capability to create that demand. The interviews (especially in growth-oriented and mixed Initiatives) reflect the capabilities for creating that internal demand. The strong internal demand for IT innovations has forced the IT function to build a selection process and to sometimes refuse demands for new developments. Excerpts for Selecting Business Innovations in Family 3 are presented below:

Table 5-47 Excerpts for Selecting Business Innovations in Family 3

Project	Examples from interviews
DDS-THEME PARK	- *We get a lot of business innovations. We have a good business confidence and we refuse demands from the business either because it's too expensive or because it's too complicated, etc. We can also decide to abandon a project or to select the right project. We prioritize and we created a Parking Lot to put projects on hold if they are out of scope for example.*
MC-OPTIC	- *If for instance a business manager asks us to implement a software for a certain function that is developed by a small company of two employees we would probably say no.*

The CIO in the DDS-THEME PARK case created a Parking Lot to keep track of new business ideas that are Out of Scope. Most business ideas are eventually processed.

Table 5-48 Excerpts for Selecting Business Innovations in Family 2 and Family 1

Project	Examples from interviews
ECM-DEFENSE	- *There are important issues related to vendors but there are also very important (and different) issues related to internal business teams who ask for new systems but who often ignore the need for the business to optimize the acquisition costs of such new systems. Internal teams ask for nice technical solutions and tend to ignore their implications for the rest of the business.*
ERP-FOOD	- *The IS Committee exists mainly to manage internal demand, to express the needs for IT solutions from the business perspective but also to communicate what we (the IT team) decide to integrate in the business units.*

The CIO in the ERP-FOOD case explains how the IS Committees built in every business unit are used to manage the unit's local demand for new systems on one hand and to push the new IT systems the headquarters decide to integrate on a global scale.

iv) Business-Technology Partnership

This mechanism reflects the formality in the explicit agreements structuring the business-IT relationships. The theme occurred in 67% of the prototypes and accounts for 5% of all Intra-Organizational Governance themes. The graph below shows that the average frequency and intensity of the theme is higher in growth-oriented initiatives.

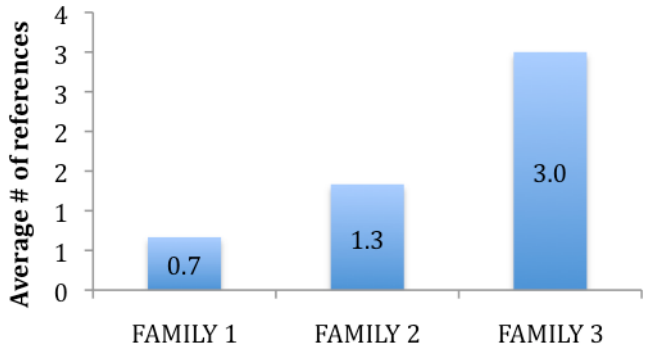

Figure 5-28 Scores for Business-Technology Partnership in Intra-Organizational Governance

Business-technology partnerships are an indication of the proactive role of both business and IT managers in strategic projects and their critical role in the decision-making process. Instead of simply executing the strategies built by other functions, IT is actively involved in the formulation of these strategies and more collaborative work is organized. In certain cases, the formality of the relationships and the importance of internal contracts between IT and the business indicates the company's efforts in making the relationship formal and in securing the IT managers' proactive role in the initiatives. Here is some of what the CIO in the MC-OPTIC case said about his formal partnership with the business:

> *Every time we launch a project, we use an extremely simple structure, therefore we conduct a ROI, a PMP, a deliverables contract, etc. which makes it a relatively simple methodology but one where each time one knows who is responsible for what.*

In the DDS-THEME PARK case the CIO clearly describes his business-technology partnership. Here is what the CIO said:

> *We have adopted a notion of Business-Technology Partnership versus IT Delivery, but one thing for certain is that we have reinforced the separation of team roles between those focused on Build and those focused on Hold, because the business is moving very quickly.*

According to the CIO, the partnership approach enables him to put a hold on certain projects, to make counter-offers and to use a Parking Lot to organize business ideas and schedule the delivery of modules and functionalities in a way that suits the IT function.

Table 5-49 Excerpts for Business-Technology Partnership in Family 3

Project	Examples from interviews
MC-OPTIC	- *The client (inside the business) is in charge of the ROI. In general, I can't have a project without a client except for the infrastructure projects.* - *My project people manage contracts with the internal clients.*
DDS-THEME PARK	- *We have a strong Business-Technology notion versus IT Delivery. We really separated the roles of those in my team who focus on the Build and those who focus on the Hold. This is critical because the business moves very quickly and when you promise all these features and phases the business becomes impatient. On the other hand, in IT you need to take the time for hyper-care and stabilization.*

An important partnership issue advanced by several respondents is to reach an agreement with the business sponsor over an estimated range for the project budget. Other respondents use critical ratios to keep a healthy business-technology dynamic in their project team.

Table 5-50 Excerpts for Business-Technology Partnership in families 2 and 1

Project	Examples from interviews
ECM-DEFENSE	- *The corporate team launches these projects in collaboration with IT and initiates feasibility studies in which the project budgets are estimated and then redistributed and billed to the various units. The process draws upon a good relationship and collaboration between IT, the top management and the business units. However, the business unit managers need to accept the range of these budgets in advance and understand their implications on all stages of the project (study, deployment and exploitation). The budget range is in the project's business case that is created in the study phase.*
PLM-AEROSPACE1	- *It has to come from the top.*
ERP-FOOD	- *We have IT people who work full time within the finance process, the forecast-to-stock process or the order-to-cash process, etc. This enables us to communicate better and to be very credible when we talk to business people about critical topics like Gap Killing, etc.*

A company's capability to recycle hybrid and multitalented people from the business to IT and vice versa has a positive effect on business-technology partnerships. This gives each party the credibility that strengthens in turn their relationships. The capability to create and recycle hybrid people is covered later in the Shared IT Support theme. The intra-organizational partnership approach helps alleviate the internal misunderstandings caused by the natural tendency for an IT function to adopt a technology-push approach. Here is what the CIO in the CRM-RESORTS case said about this risk:

> *The difficulty resides in doing it with one's clients rather than against them. Often the main shortcoming of IT is that IT people think that they know better than their users what needs to be done. It is very, very complicated because often they are right.*

v) Internal Team Selection Process

This theme reflects the way team members are selected in IT initiatives and the quality and the way competences of the selected team can impact innovation. The theme occurred in 67% of the prototypes and accounts for 4% of all Intra-Organizational Governance themes. The theme is stronger in growth-oriented and mixed initiatives (families 2 and 3) and weaker in efficiency-oriented initiatives (Family 1).

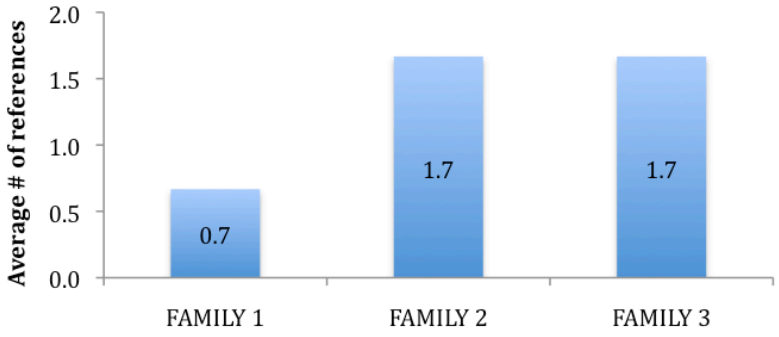

Figure 5-29 Scores for IT Selection Process in Intra-Organizational Governance

The theme was solely used to code the selection process of internal teams composed of IT and business employees. The theme also reflects the decision-making process and the power given to the CIO and project sponsor in selecting the individuals they want for the project.

Table 5-51 Excerpts for Internal Team Selection Process in Family 3

Project	Examples from interviews
MC-OPTIC	- *When projects are strategic and transversal like this one, we are forced to nominate a sponsor and leader who will be completely dedicated and no longer working for a particular business unit or function. Otherwise it would not work.* - *This project is core and the project manager is also chosen internally.*
DDS-THEME PARK	- *What I haven't told you is the importance of my previous experience for my current position and effectiveness in this IT initiative. I worked for six years with Accenture and six years with Reebok in Europe and I've been working here for 8 years now.* - *The second thing is that I stole one part of my team from the business; that is important […].*

When projects are cross functional (transversal) like the MC-OPTIC projects or the BASEL II-BANK projects, the selected project leader cannot be inside a specific business function but has to be neutral and fully dedicated to the project. In growth-oriented initiatives, these appointed project leaders are recruited from within the business because of the strategic importance of the project. This was the case in the MC-OPTIC case. In the BASEL II-BANK case on the other hand the project leader (interviewed) is a consultant working full time on the project.

Table 5-52 Excerpts for Internal Team Selection Process in Family 2

Project	Examples from interviews
BASEL II-BANK	- *In project management with the business people I did not have much choice in the selection process because we use a matrix structure in our organization.* - *Our functional managers are the ones who made most selection decisions for the business team members.*
ECM-DEFENSE	- *In the business we created three work groups for the project, one for each one of the following domains: (1) messaging, (2) web conferencing, and (3) document management.*

Interesting differences that distinguish efficiency-oriented initiatives (Family 3) from the other initiatives are the ratios used to build internal project teams and to recruit business staff for the project. Teams in efficiency-oriented initiatives shift towards the business while teams in growth-oriented and mixed initiatives shift towards the IT function. In both the ERP-FOOD and CRM-ENERGY cases, the business team members composed 2/3 of the team.

Table 5-53 Excerpts for Internal Team Selection Process in Family 1

Project	Examples from interviews
ERP-FOOD	- *We built a hybrid business-IT team in which approximately two-thirds of the members came from the business and one-third from the IT department. The top management wanted to make sure the project remained a business project and not a technical project. These principals are ok but then the devil is in the details and the execution.*
CRM-ENERGY	- *Two-thirds of my team members came from the client or business. We hired the best business people, the experts, for a full time period of four years for this project. Some were only hired for 2-3 years.*

Another important finding here is the CIO's implicit role in selecting the business people they want for the project even though an official business sponsor is appointed and has the authority to select the team members. This was particularly observed in growth-oriented initiatives (Family 3). Here is for example what the CIO in the DDS-THEME PARK said about his selection process (even though the VP of Sales & Marketing was the official project sponsor):

> *The second thing is that I stole one part of my team from the business; that is important […].*

vi) New Capabilities & Learning

This mechanism describes the IT manager's role in transferring knowledge inside the business and in creating intra-organizational learning processes and capabilities. The theme occurred in 56% of the prototypes and accounts for 8% of all Intra-Organizational Governance themes. New IT-driven organizational and managerial capabilities are presented here. The theme is composed of two sub-themes: (1) New IT Capabilities and (2) Switch Use Capabilities.

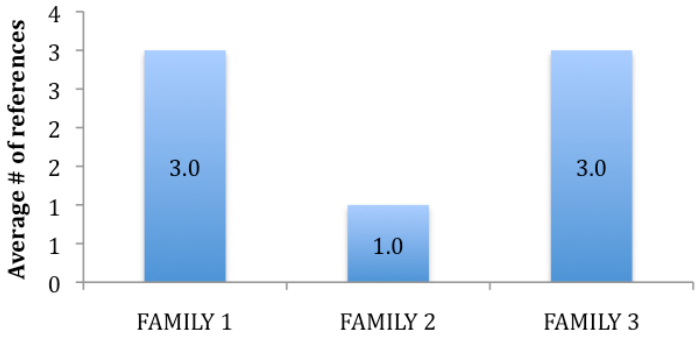

Figure 5-30 Scores for New Capabilities & Learning in Intra-Organizational Governance

The graph above shows that scores for the theme are similar in efficiency-oriented initiatives (Family 1) and growth-oriented initiatives (Family 3). The first sub-theme (New IT Capabilities) reflects the capabilities developed during the project and then kept for subsequent phases, other projects or other business units. The second sub-theme (Switch Use Capabilities) reflects the way a new IT capability is used for a function or process it was not intended to support when developed. The theme includes descriptions of reused capabilities showing a certain level of diffusion, and business and organizational innovations.

Good examples for growth-oriented initiatives are found in the EHR-HEALTH case where the capability to digitize the hospital archives in color and the capability to build complex document trees using a very large number of customizable forms were created. In the CM-INSURANCE case, the CIO explains how in the first phases, his team built a capability to convert data from the acquired company's old system to his company's system. The capability can also be used to accelerate future acquisitions. In his words:

> *But we built a conversion capability to write from their system to our system, which is flawless.*

The CIOs in both the CRM-RESORTS and the ERP-FOOD cases emphasized the learning process in their projects and the importance of quickly building the internal competences needed to operate and maintain the new CRM and ERP systems. Their goal was to become mature and independent as fast as they could. Here is what the CIO in the ERP-FOOD case said:

> *Afterwards, depending on the client's maturity in relation to the subject, we can use them to a greater or lesser degree, therefore for example at the beginning [we] used them a lot because [the company] was barely able to walk, today we are using them less and less because we know how to build, we have understood and we have learned to take great strides.*

Table 5-54 Excerpts for New IT Capabilities in all families

Project	Examples from interviews
DDS-THEME PARK	- *We are trying to build and improve the internal competency.*
ECM-DEFENSE	- *The other aspect of the ECM platform is the more rigorous management of electronic documents. In France we call this GED (Gestion Électronique des Documents). This rigor implies higher levels of formalism and in turn a capability that is greatly enhanced by the quality of the new system.*
CRM-RESORTS	- *We made sure to build and keep the IT competence inside the business so that we could maintain and improve the platform once the consulting partner and the vendors are gone.*
ERP-FOOD	- *Our stage on the learning curve, and the extent of new capabilities acquired, will affect the involvement of internal and external stakeholders.* - *We made a mistake when we hired IBM to compensate for a lack of internal competence in managing our IT infrastructure. We learned a good lesson because this is not the right way of doing things. Instead, we focused on developing our internal resources to give them the capability to manage such complex IT programs. Now that we built these internal profiles, we need less consulting and more execution.*

The new IT capabilities in efficiency-oriented initiatives (Family 1) are clearly distinguished because they focus on the capabilities needed to operate and maintain large CRM and ERP platforms that they mainly learn from the external consultants. On the other hand, the new IT capabilities in growth-oriented initiatives are discovered and built through probe and learn (trial and error) processes where both the buyer and consultants work together to co-create the solutions and capabilities.

As previously explained, Switch-Use Capabilities are unique because they are initially built for a certain function or process and then used for a different function or process they were not intended to support when created. The CIO in the DDS-THEME PARK case gave a few examples. One of them is the Yield capability that was initially built to optimize the bookings of rooms and that was then applied to optimize labor. Here is how he described this switch-use capability:

> *For example in terms of Yield, it involves optimizing hotel room occupation and the individual contributions of clients in each room. I think that it is possible to Yield Labor, which involves dealing with optimization albeit perhaps less in a General Design model, perhaps more iterative.*

Table 5-55 Excerpts for Switch Use Capabilities in all families

Project	Examples from interviews
DDS-THEME PARK	- *We took what we learned and used it to automate the tests in all our software development projects. I am now applying it in the Call Center application. Also, if Accenture innovates and improves the solution with another client, we could decide to benefit from these improvements and integrate them.* - *I always try to apply the lessons learned from one domain to another.*
ERP-FOOD	- *We made sure that the process and Core Model evolved in that everyone in the company could apply it and benefit from it around the world.*

The results show that Switch-Use Capabilities are much stronger in growth-oriented initiatives where IT managers developed the art of hitting several birds with one stone. The systematic development of innovative IT capabilities during the course of a project and the creative application of such capabilities in other projects, functions and processes is a characteristic of growth-oriented initiatives (Family 3).

Key Intra-Organizational Governance themes in efficiency-oriented initiatives

Two themes are presented in this section: (1) IT Roles & Competences and (2) Shared IT Support & Resources.

i) IT Roles & Competences

The theme reflects the traditional and technical role of the IT personnel. It occurred in 89% of the prototypes and accounts for 24% of all Intra-Organizational Governance themes. The average frequency in growth-oriented initiatives is about half the frequency in efficiency-oriented initiatives.

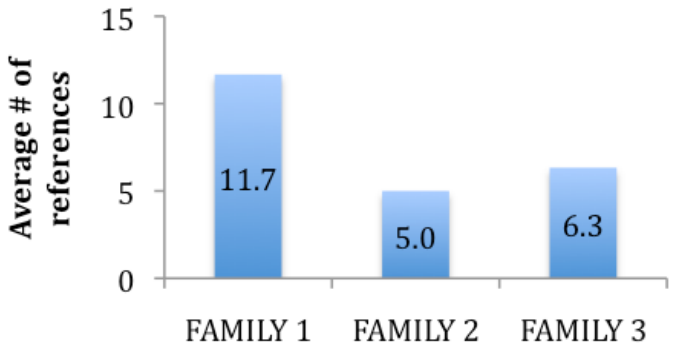

Figure 5-31 Scores for IT Roles & Competences in Intra-Organizational Governance

Only when respondents clearly defined the roles and competences of their IT team was the theme used to code the content. The excerpts coded here mainly consist of the more traditional and technical implementation tasks of the IT function.

Table 5-56 Excerpts for IT Roles & Competences in Family 3

Project	Examples from interviews
MC-OPTIC	- *From an IT function standpoint, it is finally not that complicated. The complicated IT phase is the deployment phase and the connection of the system to each client's heterogeneous system.* - *The IT work is in the optimization, in the creation of a common base, it's the Web service and mostly in the project development portion of the initiative.* - *Officially I am responsible of the costs of IT projects, not of the gains.*
PLM-ENERGY	- *At the beginning, people in the IT department were trying to compete against the IT consultant. However, the project leader emphasized the need for both parties to work together and got the senior managers on both sides to talk. The dynamics changed very quickly and things went well.*
DDS-THEME PARK	- *My role and the role of my people in IT is to show that they understand, to show that they can influence, and also to show that they master the fundamentals such as budget management, the technical architecture, and the management of contracts with consultants.*

The theme is closely connected to other themes in the research model like Shared IT Support (below), Business-Technology Partnership (above) and PMO Role & Nature (Project Governance). Two strong connecting sub-themes are the consulting knowledge/competence and the business knowledge/competence in the IT team. Here is an example of the consulting knowledge/competence given by the CIO in the DDS-THEME PARK case:

> *In my teams I have many former people from IBM, Accenture; therefore we have the ability to challenge.*

The capacity to challenge consultants was extracted in a theme presented later with the secondary Inter-Organizational Governance themes. The business knowledge/competence is clearly described by the CIO in the ERP-FOOD case (efficiency-oriented initiatives):

> *We also have mixed profiles […], business and IT, so it is never 50/50, some are more business than IT and others are more IT than business.*

Table 5-57 Excerpts for IT Roles & Competences in Family 2

Project	Examples from interviews
ECM-DEFENSE	- *One of our roles was the design of the high-level system architecture to measure the systems.* - *We created scoring grids with scales, etc. and to avoid the subjective and all the religious aspects, I asked them to be as objective as possible in their scores and to provide verifiable elements.*
BASEL II-BANK	- *We have a strong technical team here with an architectural and systemic view. Over 2000 people work in IT.* - *I have people in the IT team who are dedicated and in charge of the IT delivery vision and the IT architecture vision and they are mostly independent from the BASEL II project.*

Project Management is one of the competences that emerged through the coding process. In growth-oriented initiatives (Family 3), small and specialized firms are often hired for the Project Management function (the PLM-ENERGY case for example) while in other cases the role is given to the IT consulting partner (the DDS-THEME PARK case). In all cases, an internal business manager is appointed as the project sponsor and the CIO is leading the project and the decision-making process. Also, as seen in the PMO Role & Nature theme (Project Governance), there's a tendency in innovative IT functions to dismantle the PMO and distribute the project management responsibilities and capabilities throughout the business with the central

coordination point being the CIO. This was also the case in efficiency-oriented initiatives. Here is what the CIO in the CRM-RESORTS case said about Project Management:

> *It is a project management office, therefore we (1) manage skills, we (2) manage sourcing, and we (3) manage finance. Basically it is a business job.*

Table 5-58 Excerpts for IT Roles & Competences in Family 1

Project	Examples from interviews
ERP-FOOD	- *The technical architecture is centralized and it runs in our unique Data Center in Montpellier. I have an IT Operations team of 30 professionals that steers this activity that was outsourced to IBM.* - *We apply these Best Practices effectively because of the Core Model and because we are the only ones in our industry who completely thought through the integration of small subsidiaries.* - *We completed internally all the program management and the competency.*
CRM-RESORTS	- *With regards to consultants what I think is important is the need to always keep the competence and the knowledge inside the business.* - *The technology changes every three years, so for example SOA was invented and we've been doing SOA for years without knowing it. Tomorrow another thing will be invented. Web services have 5-6 years already.*
CRM-ENERGY	- *The IT department in our business is the integrator.* - *We had 80 million objects to convert, we had to take them out of the old system, clean them, and enter them in the new system. I am in charge of decommissioning the old systems.*

So what is the CIO's role in strategic IT initiatives? Almost all cases show a critical leadership role for the CIO. The IT manager's leadership seems to be a constant in all families. In the ERP-FOOD case for instance (Family 1), the CIO convinced the company's executives to remove the program's governance system from the business side to the IT department. His stronger leadership position enabled him to make more important decisions that affected the program positively. The IT components in the project team were enhanced and this enabled the CIO to constantly improve the core model while systematically implementing it (a set of new processes) throughout the business. The CIO in this case plays the central role in orchestrating all business units globally by controlling standard business processes and unique master databases centrally. Additionally, the IT function has a growing role in the management of careers and human resources. IT managers use mechanisms like Competency Centers and IS Universities to build the company's IT competence for the future. See the Shared IT Support theme and the IS Universities theme in the next pages for more details.

In sum, the findings here can be grouped in the following way:

- Project execution (implementation) roles and competences and the technical fundamentals are more emphasized in efficiency-oriented initiatives.
- Project management has become central to the IT function and PMO structures are replaced by structures inherent to the IT function
- The CIO has a stronger leadership role in growth-oriented initiatives. His decisions implicitly supersede the decisions of the other stakeholders.
- The IT function has a critical role in instilling rigor and discipline in processes. IT managers have thus an important role in the quality assurance process.
- The IT function is used as a central learning and education platform in the business especially for creating hybrid business-technology profiles. Competency Centers and IS Universities are key mechanisms in the platform and individuals with a consulting background are hired to build a capability to challenge consultants.

ii) Shared IT Support

This theme occurred in 56% of the prototypes and accounts for about 7% of all Intra-Organizational Governance themes. Interestingly, the Shared IT Support mechanisms are almost completely absent in mixed and growth-oriented initiatives (families 2 and 3).

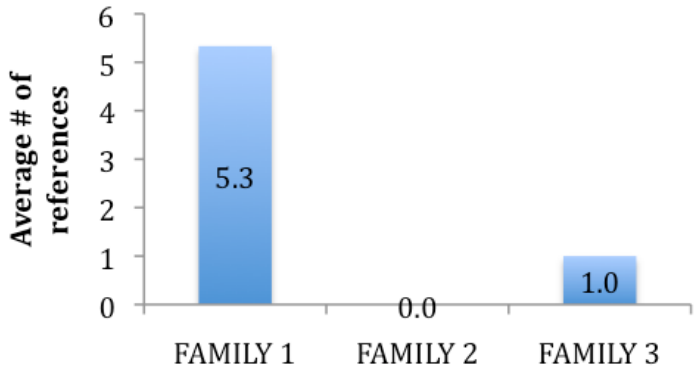

Figure 5-32 Scores for Shared IT Support in Intra-Organizational Governance

The mechanism is composed of two sub-themes: (1) Competency Center and (2) Shared Services / Resources. The Competency Centers built in efficiency-oriented initiatives (Family 1) are used

effectively to build internal bridges between the business and IT. These mechanisms enable the CIO to: (1) manage internal careers and create incentives, (2) develop technical competences in business people (who join the IT team for 2-3 years then go back to the business), and (3) create high-profile competences in people who have the ability to build technical, business, and relational competences. Such mechanisms necessitate a strong relationship between the CIO and the HR people who manage common career plans and jointly build systems for measuring the hybrid competences needed for using new IT systems effectively throughout the organization and in turn increasing the absorption rate of IT-driven innovations.

Only one respondent in growth-oriented initiatives (Family 3) brought up the theme. The CIO in the DDS-THEME PARK case was re-using the Competency Center he created in 2001 when he integrated SAP to support his DDS project. Here is what the CIO said:

> *There are two ways of doing this: (1) recycle IT teams in other domains, and (2) keep the key business people in the IT Competency Center.*

Table 5-59 Excerpts for Competency Center in Family 1

Project	Examples from interviews
ERP-FOOD	- *I have a competency center with almost 150 people who manage the evolution of the core model, the support, and the deployment projects.* - *We need important business competencies in our SAP competency center for example.* - *Another way of seeing these business competencies, and this is what I tried to develop, is to identify High Potentials in the IT function in whom we develop simultaneously: (1) the business capability and knowledge, (2) the technical competences, and (3) the relational competences. The three critical aspects.*
CRM-ENERGY	- *I put in place a full support center for the new system.* - *Things are going well, we have six months left for the last deliverable, and an important issue is important to mention; with an integrated ERP solution, there's an integrated support. We previously had 250 systems and each system had its small support team. So we had to put in place a SAP Competency Center to manage all the Distribution division of the business.*

The CIO in the ERP-FOOD case for example has a competency center with about 100-150 people who manage: (1) the evolution of the core model, (2) the support, and (3) the deployment projects. The scores seem to be higher in efficiency-oriented initiatives for two reasons: (1) the integrated ERP and CRM platforms are mature and are packaged with manuals and instructions to build the competency center, and (2) large IT consulting partners (Accenture and Capgemini

for instance) who are very experienced with such platforms were hired to help the business integrate the platforms and build the Competency Centers.

Other shared support services and resources such as Architecture and Change Management resources are described here. In the CRM-ENERGY case for instance the CIO used in his project the same Change Management team used in the PLM-ENERGY case.

Table 5-60 Excerpts for Shared Services in Family 3 and Family 1

Project	Examples from interviews
MC-OPTIC	- *We use common resources such as networks, architectures, systems, etc. So we did not need to create separate resources.*
CRM-RESORTS	- *Most of the design and architecture was centralized and reused but certain elements had to be adapted to the culture. Take for example the case of your French Canadian compatriots, I can't communicate with Quebecers the way I would communicate with English Canadians even with a Website in two languages, the language is not enough.* - *The difficulty in enriching the architecture with cultural knowledge is that you cannot do it if you are decentralized because your systems would very rapidly diverge.* - *If you take a look at our Canadian website and our global website you'll see that the layouts of the pages are the same and that the underlying technology is the same.*
CRM-ENERGY	- *We have a dedicated team for change management that we share with the PLM project.*

The theme here and the Switch-Use Capability theme (previously seen) have some features in common. The differences however are that:

- Shared Services are planned in advance while Switch-Use Capabilities are generally discovered throughout a probe-and-learn process.
- Shared Services contain more standard and common activities whereas Switch-Use Capabilities contain more context-specific activities.
- Shared Services are more important in efficiency-oriented initiatives but Switch-Use Capabilities are more important in growth-oriented initiatives.

5.2.2 Secondary Intra-Organizational Governance themes

Five secondary Intra-Organizational themes emerged at the end of the qualitative analysis process: (1) IT Strategy & Organization, (2) Decentralization, (3) R&D Role, (4) Knowledge Management, and (5) IS Universities. This table shows where and to what extent each secondary theme occurred in the sample:

Table 5-61 Scores of the secondary intra-organizational governance themes

Intra-Organizational Governance (secondary themes)	1: CRM - ENERGY	2: CRM - RESORTS	3: ERP - FOOD	4: BASEL II - BANK	5: ECM - DEFENSE	6: PLM - AEROSPACE1	7: DDS – THEME PARK	8: MC - OPTIC	9: PLM - ENERGY	**TOTAL**	**% OF CASES COVERED**
1: Decentralization	0	0	1	4	1	0	0	2	0	**8**	**44%**
2: IT Strategy & Organization	0	5	0	0	3	0	0	3	0	**11**	**33%**
3: R&D Role	0	0	0	0	0	0	0	10	0	**10**	**11%**
4: Knowledge Management	0	0	0	0	0	0	3	0	0	**3**	**11%**
5: IS Universities	0	0	2	0	0	0	0	0	0	**2**	**11%**
TOTAL	**0**	**5**	**3**	**4**	**4**	**0**	**3**	**15**	**0**	**34**	**61%**

The following graph shows the results for each secondary Intra-Organizational Governance theme throughout the families of initiatives:

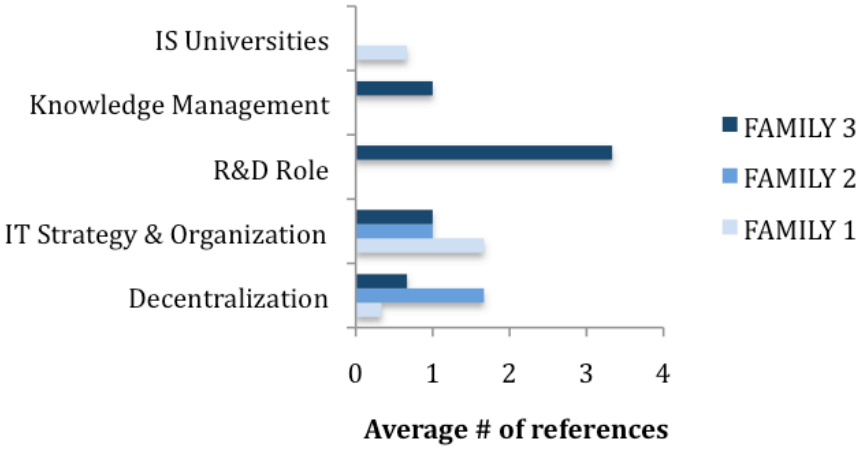

Figure 5-33 Scores of secondary themes in Intra-Organizational Governance

ii) Decentralization

Decentralization is closely linked to the company's efforts to give the business units more control and power over the decisions that affect the IT initiatives. The IT managers in efficiency-oriented initiatives (Family 1) favored centralization whereas those in growth-oriented initiatives

(Family 3) favored decentralization. In growth-oriented initiatives (Family 3) for instance, the CIO in the MC-OPTIC case, only considers infrastructure projects and projects of generic applications as centralized and pure IT projects. The core and innovative MC-OPTIC initiative was decentralized from an IT perspective because of the ownership shifting towards the business. On the other hand, the CIO in the ERP-FOOD case in efficiency-oriented initiatives (Family 1) was asked to centralize all his IT activities for business integration and increased control over subsidiaries. Changing his company's decentralization culture was one of his priorities.

ii) IT Strategy & Organization

The theme combines general IT principles and approaches used by the IT managers to guide their strategies and decision-making process. The CIO in the MC-OPTIC case for example describes how his IT department is organized in 4 major IT activities and how different rules and principles are used to govern these activities in the overall IT strategy. These 4 activities are: (1) infrastructures, usually outsourced, (2) the ERP provided by Oracle for finance, mass production and logistics, (3) personal productivity and collaboration tools like Microsoft and Google, and finally (4) the core applications, the heart of the business, where the company's expertise is translated and that should not be outsourced. The latter activity is where the MC-OPTIC project falls.

iii) R&D Role

This theme was only observed in the MC-OPTIC case. The CIO highlighted his capability to translate the knowledge that comes out of the company's R&D department into information systems that create value and growth opportunities. The company invests about 5% of its revenues in R&D projects and the CIO works really closely with the R&D department.

What the other growth-oriented initiatives (Family 3) have in common with the MC-OPTIC case is the translation of core and unique IP into innovative applications. The difference is that the translation in the other cases was done in an open innovation fashion, which is more complex

and harder to understand and observe. This critical open innovation process is explained in the Inter-Organizational Governance section with themes like Partnerships and Influencing Vendor Roadmaps.

iv) Knowledge Management

Surprisingly, only one respondent in the research discussed knowledge management topics. The concept is thus not as important as it seemed in governing strategic IT initiatives. The CIO in the DDS-THEME PARK case for instance describes how his department is still weak in documenting innovative IT initiatives and applying knowledge management techniques.

v) IS Universities

Only the company in the ERP-FOOD case (Family 1) had a structured IS University in place. IS Universities with Competency Centers (previously seen) are important mechanisms that improve internal collaboration and speed up the development and adoption of innovative applications. IS Universities complement Competency Centers in creating the hybrid profiles that bridge the gaps between the business and the IT function.

5.3 INTER-ORGANIZATIONAL GOVERNANCE AND INNOVATION

Interestingly, inter-organizational governance shows the overall highest scores. The results show that senior IT managers focus more on their external (inter-organizational) relationships with consultants and vendors than internal (intra-organizational) relationships in more exploratory and growth-oriented initiatives. Using the nine prototypes selected in the previous chapter, inter-organizational governance scores 429 as opposed to 423 and 283 for project governance and intra-organizational governance respectively. Furthermore, the diversity of Inter-Organizational themes is higher than both project governance and intra-organizational governance themes.

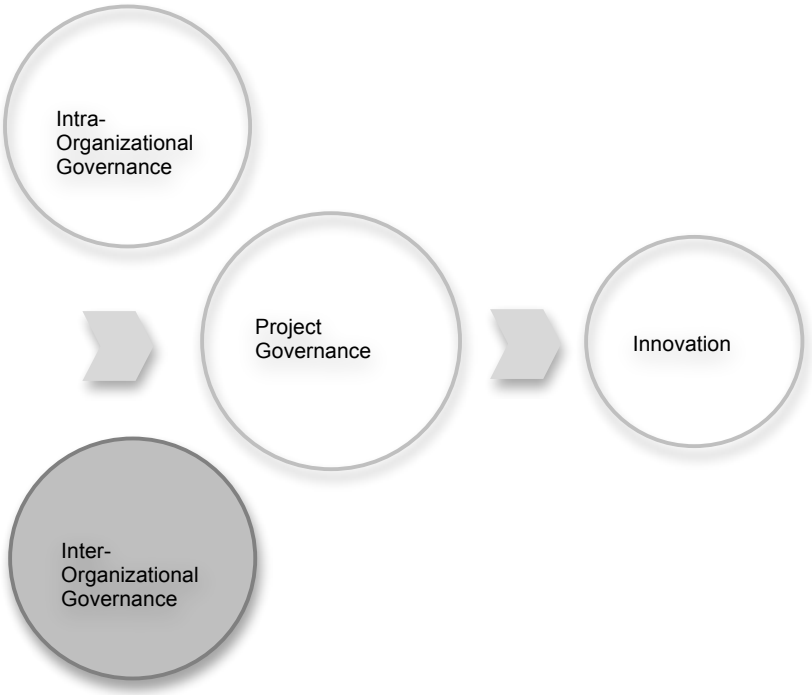

Figure 5-34 The Inter-Organizational Governance block

5.3.1 Primary Inter-Organizational Governance themes

At the end of Iteration 7 in the qualitative analysis process, ten primary themes in the Inter-Organizational Governance block emerged from the interviews. The table below shows the scores obtained for each inter-organizational mechanism in the nine prototypes of IT initiatives.

Table 5-62 Scores of all primary themes in Inter-Organizational Governance

Inter-Organizational Governance (primary themes)	1: CRM - ENERGY	2: CRM - RESORTS	3: ERP - FOOD	4: BASEL II - BANK	5: ECM - DEFENSE	6: PLM - AEROSPACE1	7: DDS – THEME PARK	8: MC - OPTIC	9: PLM - ENERGY	**TOTAL**	**AVERAGE FREQUENCY IN ALL CASES**	**% OF CASES COVERED**
1: Partner Selection Processes	17	11	1	19	22	13	10	2	23	**118**	**13.11**	**100%**
2: Partner Active Role	7	14	9	2	10	12	19	14	22	**109**	**12.11**	**100%**
3: Outsourcing / Externalization	4	7	9	8	9	11	7	14	2	**71**	**7.89**	**100%**
4: Partnerships	1	0	1	0	7	9	5	3	9	**35**	**3.89**	**78%**
5: Contract Management	0	5	2	0	8	0	4	8	5	**32**	**3.56**	**67%**
6: Adopting Applications	0	4	2	0	0	9	2	0	5	**22**	**2.44**	**56%**
7: Influencing Vendor Roadmaps	0	0	0	2	0	6	5	0	3	**16**	**1.78**	**44%**
8: Social and Personal Contacts	0	1	0	0	3	0	2	0	2	**8**	**0.89**	**44%**
9: External R&D Role	0	0	0	0	4	0	0	6	0	**10**	**1.11**	**22%**
10: Regulations	4	0	0	4	0	0	0	0	0	**8**	**0.89**	**22%**
TOTAL	**33**	**42**	**24**	**35**	**63**	**60**	**54**	**47**	**71**	**429**	**47.67**	**100%**

The following chart illustrates the overall relative importance of each primary theme:

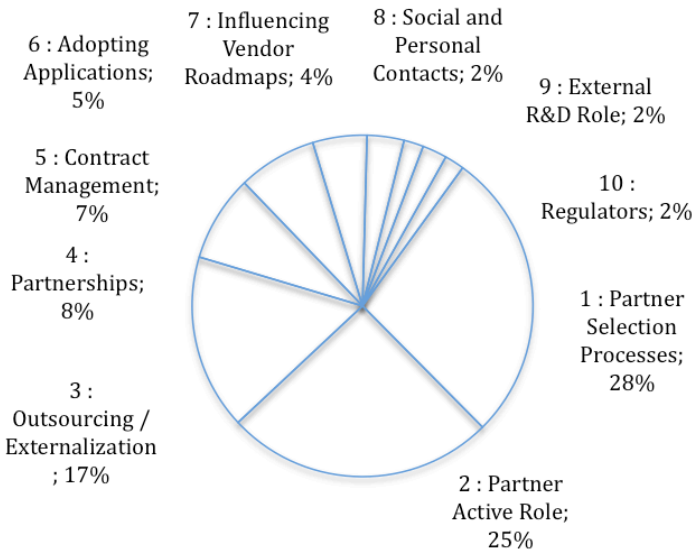

Figure 5-35 Relative importance of all primary inter-organizational governance themes

The scores for inter-organizational governance are higher in growth-oriented initiatives (Family 3) and significantly lower in efficiency-oriented initiatives (Family 1). Mixed initiatives also showed high scores that are slightly lower than growth-oriented initiatives. The graph below illustrates the overall scores for inter-organizational governance throughout the three families of IT initiatives:

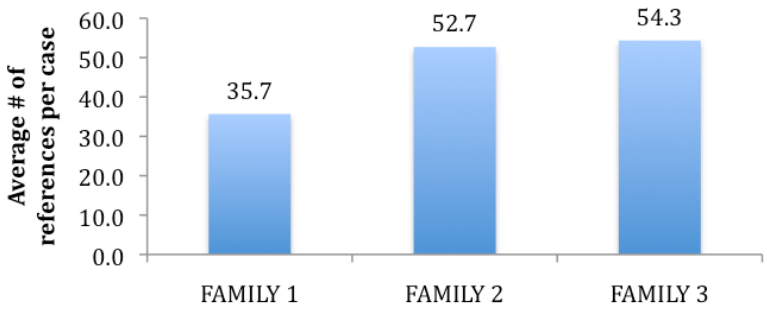

Figure 5-36 Average inter-organizational governance scores per family of initiatives

The two following graphs compare the density and coverage of the themes for each one of the three families of IT initiatives.

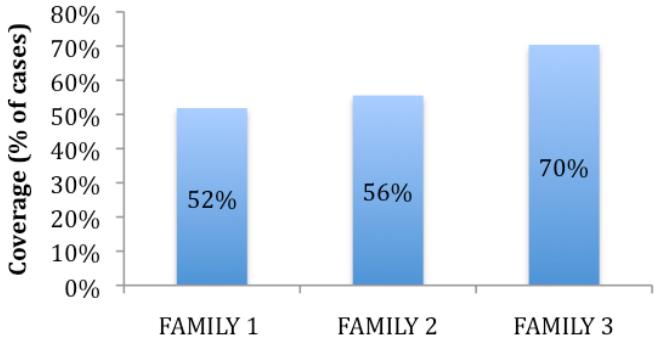

Figure 5-37 Average coverage of cases with inter-organizational governance

Coverage is higher in Family 3 (above) and density is slightly higher in Family 2 (below). The variations here (difference between scores of families) are higher in Inter-Organizational Governance than Project Governance and Intra-Organizational Governance.

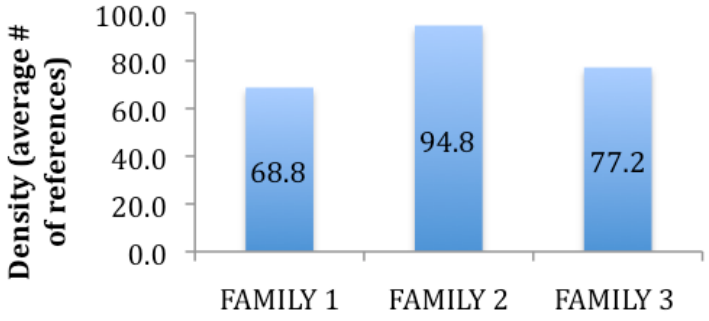

Figure 5-38 Average density of cases with inter-organizational governance

The scores of the ten primary inter-organizational governance themes for each one of the three project families are presented in the following figure.

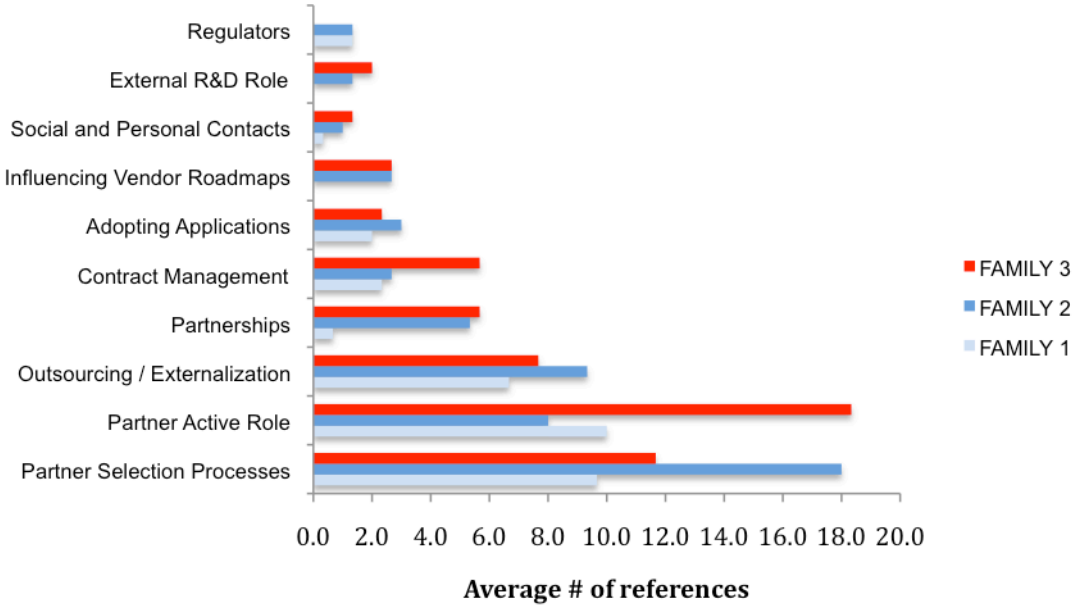

Figure 5-39 Scores of the primary inter-organizational governance themes

Key inter-organizational governance themes in growth-oriented initiatives

While the key project governance themes in growth-oriented initiatives (as opposed to efficiency-oriented initiatives) accounted for 72% of all project governance references and key intra-organizational governance themes in growth-oriented initiatives accounted for 68% of all

intra-organizational governance references, key inter-organizational governance themes in growth-oriented initiatives account for 98% of all references to inter-organizational governance. The themes presented here that showed higher scores in mixed initiatives are still more critical for growth-oriented initiatives as opposed to efficiency-oriented initiatives. These themes include Partner Selection Process, Outsourcing / Externalization, and Adopting Applications. Therefore, 90% of inter-organizational governance themes (all key themes in growth-oriented initiatives combined with the key themes in mixed initiatives) can be considered key drivers in growth-oriented initiatives.

i) Partner Selection Process

The theme reflects the great concern of IT managers over the selection of external partners and commercial software packages and solutions. The concern and difficulty of the selection process is a function of the rapid expansion of the external network of IT companies and technologies.

The theme occurred in 100% of the prototypes and accounts for 28% of all inter-organizational governance themes. The results show a higher intensity and complexity of the Partner Selection Process in mixed initiatives.

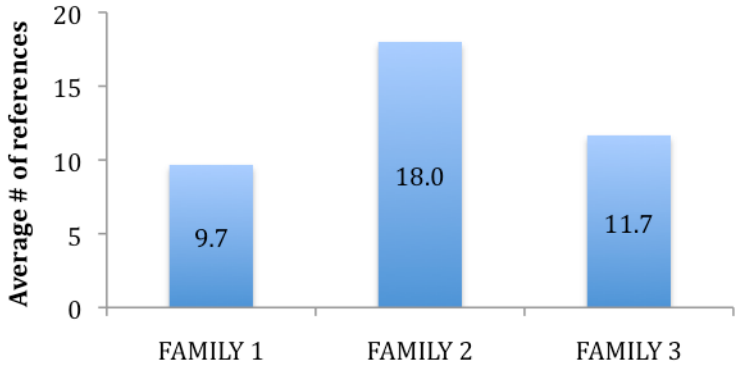

Figure 5-40 Scores for Partner Selection Process in Inter-Organizational Governance

The theme is composed of two sub-themes: (1) Vendor Selection Process, and (2) Consultant Selection Process. The first sub-theme (Vendor Selection Process) accounts for 71% of all references combined which suggests that the Vendors Selection Process is twice as difficult.

Because IT consultants in half the growth-oriented initiatives had a very significant role in selecting the vendors for the projects, the buyer was relieved from many difficulties associated with the process and this was reflected in the results.

The buyer in the DDS-THEME PARK case adopted a BOB (Best-of-breed) approach in the selection process (conducted in partnership with Accenture) while the buyer in the PLM-ENERGY case adopted an integrated approach with IBM and Dassault-Systèmes controlling the federation in the platform.

Table 5-63 Excerpts for Vendor Selection Process in Family 3

Project	Examples from interviews
PLM-ENERGY	- *There were a few players on a PLM level but niche player, Best of Breed applications on the market.* - *The number of player decreased with time. There were eight competitors at the beginning and then five and finally three before selecting Dassault Systèmes.* - *In the Proof of Concept phase there were still three players. At this stage IBM and Dassault were still in an Investment mode, they had still gained zero dollars.*
DDS-THEME PARK	- *Our distinction is that we have many front-office businesses; we have the hotels, the sales of stays, the ticket sales, etc. So we try to adopt Best of Breed software packages and we are the integrator in terms of applications and also in terms of processes.*

In mixed initiatives, the process was more extensive and critical for the buyers. The BASEL II-BANK case is a really good example where the IT manager adopted a structured method for selecting vendors. The bank had two options for its portfolio of initiatives, either by (1) developing new applications internally, or by (2) buying commercial applications from vendors. The portfolio was thus split in two sets of applications. The effectiveness of the decision to buy commercial software packages depended on the following major factors: (1) the recognition of weak capabilities in certain domains that the company wants to enhance by integrating BOB applications, (2) the levels of maturity, stability and testing of commercial applications, (3) the way vendors include valuable and up to date content with their tools, and (4) the company's understanding of the external network of vendors, their products and the value they represent for the company.

Table 5-64 Excerpts for Vendor Selection Process in Family 2

Project	Examples from interviews
BASEL II-BANK	- *Before selecting the vendors, we looked at our current systems and needs and determined which domain needed a software package versus a homemade evolution.* - *We chose to go towards the vendors with the expertise. These vendors are very powerful and we need them because they have both the technical and the content expertise.*
PLM-AEROSPACE1	- *Because 90% of our customers use the Dassault suit of products and you want to be able to collaborate with them effectively.* - *In fact, some clients demanded that we use the Dassault platform.* - *You got to understand, I mean to a certain point we were already a CATIA house, so if you choose for example to go with EDS, that's one thing but if you just choose to take the next step up and do a progressive implementation with the components you already got, it's a far easier piece to choose.*

In mixed initiatives the following selection criteria were highlighted: (1) the quality of RFI responds and the vendor's willingness to share information and cooperate, (2) the professionalism of the vendors and their abstention from using unorthodox techniques and personal contacts to win the bids, (3) the quality of RFP responds, (4) the quality of the content that vendors have the ability of combining in their offering with their software (financial information for instance), (5) the vendor's stability and the risks associated with mergers and acquisitions, and finally (6) the technologies and commercial software used by major clients who aim at integrating the buyer (who is one of their suppliers) in their product lifecycle management system.

Additionally, the results in Family 2 (mixed initiatives) show unexpected findings with regards to the sequence in selecting consultants and vendors. In both the ECM-DEFENSE and the PLM-AEROSPACE1 cases, the buyers selected the vendor before selecting the IT consultant. In the PLM-AEROSPACE1 case for instance, the selection of Dassault Systèmes preceded the selection of the consultant. The first selection criterion in this case was the request from the company's major clients to integrate its engine design system in the overall aircraft lifecycle management system. Most of the company's clients (like Bombardier) already operated with the Dassault platform.

In efficiency-oriented initiatives (and some of the mixed initiatives), managers use structured approaches and mechanisms to gather enough information before defining requirements and

selecting external partners. For example, the buyer in the ECM-DEFENSE case used two mechanisms to gather information from the vendors before completing a list of requirements: (1) requests for information (RFIs), and (2) structured discussions. The discussions were carried out in a proactive and exploratory way. Of course, the buyer's leadership position (in the industry) increased the chances of obtaining quality information from RFIs and discussions.

Table 5-65 Excerpts for Vendor Selection Process in Family 1

Project	Examples from interviews
CRM-ENERGY	- *The condition was that it was necessary for them to show us that it works and that it meets 80% of our needs. We asked for 1820 functions for all our processes.* - *We got five proposals for the solution and three proposals for the professional services.*
CRM-RESORTS	- *With only some adaptation an ERP implementation works well because the following version is easily implemented. If you change let's say 30% of the code of any ERP, you end up with a homemade system that is no longer an ERP. Then when you decide to move to the new version you're dead because you have to start a new project from scratch. In other words, when choosing an ERP system you have to look at the flexibility of the system.*

Some vendor selection criteria in efficiency-oriented initiatives were not seen in mixed and growth-oriented initiatives, for example: (1) the ability to provide a fully integrated solution, (2) the vendor's ability to respond to a very large number of functional criteria (very well documented and detailed in the RFP), and (3) the vendor's ability to support the size of the buyer and to firmly commit with a large warranty fund at the front-end. The above criteria are very specific to efficiency-oriented initiatives. Here is for example what the respondent in the CRM-ENERGY case said about the functional criteria:

> *The condition was that it was necessary for them to show us that it works and that it meets 80% of our needs. We asked for 1820 functions for all our processes.*

In the CRM-POST project, the respondent highlighted the importance of choosing a vendor that has the ability to support the size of the buyer:

> *There was a selection process and we had criteria such as the need for a vendor that could support the size of our company, the cost relationship, etc. and SAP was selected.*

The second sub-theme (Consultant Selection Process) occurred half the times of the first sub-theme (Vendor Selection Process). The findings suggest that buyers who decide to partner with

an IT consultant in growth-oriented initiatives (like the buyers in the PLM-ENERGY and DDS-THEME PARK cases) end up with little influence (if none) over their vendor selection process. Three key selection criteria were found: (1) the consultants technical and business knowledge and especially the consultant's expertise in the buyer's industry, (2) the consultant's willingness to make large up-front investments in product prototypes and proof of concepts (with the vendors), and (3) the CIO's past relationships and personal contacts with the consultants. The latter is described under Social & Personal Contacts (seen earlier).

Table 5-66 Excerpts for Consultant Selection Process in Family 3

Project	Examples from interviews
PLM-ENERGY	- *The five largest shipbuilding companies in the world work with IBM, including manufacturers of aircraft carrier. Newport News is one of IBM's good clients for example.* - *The initial phase was very long because of the long negotiations over the concept and the philosophical questions. We were still not talking about the prices. The debate was about going with a partner offering an integrated solution.* - *IBM was the only company offering an integrated solution. Otherwise, the company would have had to work with five to eight different specialized providers to get the best solution in each domain like piping for example.*
DDS-THEME PARK	- *They have the knowledge in the Travel and Tourism industry, they understand. They are the best in the industry and they worked with leaders like Air France, Air Transat, Expedia, Voyages SNCF, etc.*

In mixed initiatives, the large IT consultants (IBM, Accenture and Capgemini) had no role and instead the buyers selected individual consultants and smaller vendor-independent consulting companies.

Table 5-67 Excerpts for Consultant Selection Process in Family 2

Project	Examples from interviews
PLM-AEROSPACE1	- *Very few companies would be totally software independent because to be able to provide good services, you need to know the software inside out. So consulting companies will typically specialize in one specific type of software. Very few cover many software platforms.*
BASEL II-BANK	- *We used consultants because of the temporary aspect of the project and the quick expertise that we need. Before I even started to work on the project, the consulting suppliers would call me to convince me to take their data approach instead of the function approach but I never wanted to.* - *The consulting firms had a data and technological approach and we wanted a process and function approach.*
ECM-DEFENSE	- *We also chose the consultants according to their ability to provide studies of the initiative and to help us determine the plan or roadmap for the project. This included the detailed design of the exploitation architectures, studies for how to implement the system and solutions for all the interfacing issues with our existing infrastructure and systems.*

Here is for instance what one of the respondents in the PLM-AEROSPACE1 case said about their selection of a vendor-independent consultant:

I guess the one independent group we took was Daratech; we frequently attended the Daratech meetings. Daratech is an organization very much focused on product development. They are kind of vendor-independent.

In efficiency-oriented initiatives, the criteria for selecting consultants include: (1) size and stability, (2) the track of record and past relationships, (3) expertise in methodology, (4) the know-how in the industry and with the selected commercial platform, and (5) the availability of expert profiles within the IT consulting company. In the CRM-ENERGY case:

We looked for three things in a professional services provider: (1) expertise in methodology […], (2) experience in SAP product Utilities know-how, and (3) expert resources for CRM, invoicing, etc., who are familiar with the solution.

The results show that buyers in efficiency-oriented initiatives (Family 3) selected vendors before selecting IT consultants. For example, in the CRM-ENERGY case the buyer would have not selected Capgemini if it lacked know-how and experience with SAP products.

Table 5-68 Excerpts for Consultant Selection Process in Family 1

Project	Examples from interviews
CRM-RESORTS	- *There are no specific rules. However, there are fundamental subjects like the size of the partner. The size of both parties should be almost equal, this reassures us. You do not put all your eggs in one small supplier who will be acquired tomorrow and who will run away to buy a boat in the Bahamas.*
CRM-ENERGY	- *There was a team of 75 persons from all the business divisions like Technology, Finance, HR, etc who were dedicated to writing the RFP and who defined the selection criteria. There were 2800 criteria for the solution and 450 criteria for the professional services.*
ERP-FOOD	- *We decided to outsource the infrastructure aspect to IBM. However, we only outsource the Actual Doing or in other words, the execution. I have high-level people on my team who are in charge of steering these outsourcing activities. This is the condition to properly manage the outsourcing relationship while being in control and having the option to reverse if needed.*

Interestingly, cost was never mentioned as a critical selection criterion in any project family and in neither the vendor selection process nor the consultant selection process. In general, one of the key selection criteria in growth-oriented initiatives is the partner's willingness and capability to commit early in the project and to invest substantially in innovation and R&D before guaranteeing the contract. The cases also show that vendors and consultants only invest when (1) the opportunity is strategic for them and implies the development and penetration of new

markets, and (2) when they have solid and personal relationships with people they can trust who work for the client. These two conditions were clearly met most of the growth-oriented initiatives where the consultants like IBM and Accenture all committed early with large up-front investments.

ii) Partner Active Role

This second inter-organizational theme describes the active role of external partners (consultants, vendors and experts) used in the IT initiatives. The theme occurred in 100% of the prototypes and accounts for 25% of all inter-organizational governance themes. The results for the theme are much higher in growth-oriented initiatives (Family 3) and suggest that exploratory innovation in IT initiatives is strongly linked to the active involvement of external partners (consultants, vendors and experts).

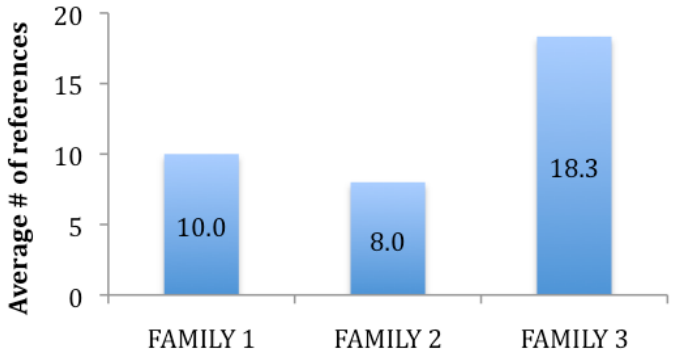

Figure 5-41 Scores for Partner Active Role in Inter-Organizational Governance

The theme is composed of four sub-themes: (1) IT Consultant Role, (2) Strategy Consultant Role, (3) Vendor Role, and (4) Expert Role. Overall, the IT Consultant Role shows much higher results than the other sub-themes.

In the DDS-THEME PARK case, the CIO manages two types of relationships with the same IT consultants: long-term relationships in building roadmaps and IT strategies, and medium-term relationships in delivering specific projects like the DDS. Once the consultant completes the

integration task, the system is transferred to the CIO's organization for maintenance and further developments.

The results in growth-oriented initiatives (Family 3) are interesting in that there was no involvement at all from any IT consulting firm in the MC-OPTIC case. In this case, the IT manager decided to only hire strategy consultants, project managers and experts for the implementation phases of their projects. Nonetheless, growth-oriented initiatives (Family 3) scored higher than both mixed and efficiency-oriented initiatives because when buyers decide to work with IT consulting firms in growth-oriented initiatives they form strong partnerships and heavily rely on their expertise and capabilities to build the innovative system.

Table 5-69 Excerpts for IT Consultant Role in Family 3

Project	Examples from interviews
PLM-ENERGY	- *IBM is the global distributor for Dassault. IBM often develops the opportunity and at a certain point in time brings in the Dassault people.* - *We hired an important person at IBM for a contract of three months who worked for two years on Newport News and who had the knowledge we needed.* - *IBM was in charge of the IT architecture for all the PLM system. IBM delivered the architecture after the deal was signed.*
DDS-THEME PARK	- *The consultants were responsible of the Detailed Design that we then validated. They also trained our teams, including business people, on the technologies and methodologies.* - *After a certain time, if the integrator makes a development choice that consumes more IT energy for either the hardware or software, it is his problem, because I pay for a solution.* - *One of our models is to let the integrator go and to take back the support internally.*
MC-OPTIC	- *We hire individual consultants for the integration phase, to manage projects, etc.* - *I rarely hire consultants in my IT projects but I usually hire project managers, experts, etc.*

IBM was hired in the PLM-ENERGY case and Accenture in the DDS-THEME PARK cases and their roles were critical in the co-development of the PLM and DDS platforms. The partnerships and joint ventures created between the buyers and IT consultants are described and analyzed in the Partnerships theme.

Only one of the buyers in mixed initiatives (see excerpts below) worked with a large IT consulting firm. The aerospace company in the PLM-AEROPSACE1 case worked with IBM and Dassault Systèmes. However, IBM played a much smaller role in this project than the role it

played in the PLM-ENERGY project. In the banking and insurance initiatives (Family 2), only individual IT consultants were recruited.

The CIO in the ECM-DEFENSE case recruited a small IT consulting firm for the open source component of the ECM project. The company's role was to audit the open source vendor selected for the development work and to advise the buyer.

Table 5-70 Excerpts for IT Consultant Role in Family 2

Project	Examples from interviews
ECM-DEFENSE	- *Instead of using a software package on the market we decided to choose an open source solution for both the employee and client portals. We hired a small specialized company for the development and integration of the open source solution but to help the company do a better job, we hired another consulting firm with an expertise in web applications who acted as an external expert and consultant and as an auditor to verify the work done by the other company.*
BASEL II-BANK	- *The consultants need to complete their job very quickly and they need to be remunerated well because we are not the only Canadian company integrating the new BASEL II requirements and for example the Banque Nationale is currently stealing some of our consultants for their own project.*
PLM-AEROSPACE1	- *Then we have a governance committee set up with for example Dassault and IBM where we meet on a fairly regular basis to know where the project is going.*

In the ECM-DEFENSE case, innovations were not expected to happen once contracts were signed. This rational approach is rooted in the company's engineering and military history where projects are executed in a spec-and-build fashion. Nonetheless, the buyer uses smaller and more specialized IT consultants and experts to build new capabilities needed for the project such as open source capabilities to build certain web applications. The implication of smaller partners enables the absorption of new ideas and capabilities in a faster and more flexible way.

On the other hand, in all efficiency-oriented initiatives (without any exception), large IT consulting firms were hired and had an important role. However, their role was not as strategic and important as the roles of IT consulting firms in growth-oriented initiatives. Capgemini was hired in the CRM-RESORTS and CRM-ENERGY initiatives and Accenture was hired in the ERP-FOOD initiative. In those large business integration and transformation projects, the IT consultants provided the following: (1) they provide structured methodologies and rigorous program management approaches, (2) industry best practices, knowledge and benchmarking, (3)

extensive knowledge of CRM and ERP platforms, (4) variability and flexibility in staff which helps the firm address the fluctuations in the projects, and (5) change management practices.

Table 5-71 Excerpts for IT Consultant Role in Family 1

Project	Examples from interviews
ERP-FOOD	- *We use some consultants from Accenture as variability. We have 85 fixed consultants and 65 who are used according to the variability of the work that needs to be done every year.* - *The real role of the consultants is very important. Because we came from a very different culture of decentralization, we would have never succeeded without the help of Accenture with its Program Management competence, its ability to structure a program, and its vast expertise with SAP projects.*
CRM-RESORTS	- *The consultants bring a lot of value but they cannot help you become different.* - *We buy consulting services including the implementation, the training, the customization, etc. but we also buy some Change. In other words, we buy a part of the team for expected changes because we know we will be doing some adaptations in the project.*
CRM-ENERGY	- *When we got to the Project mode we used the approaches, methodologies and tools provided by Capgemini to conduct such projects.*

Some buyers used their IT consulting partners for the complete array of activities these companies offer from strategy to programming. Other buyers worked with specialized strategy consultants at the front-end of their projects to help them define and frame the problem and choose the best possible course of actions.

However, strategy consultants had a more significant role in growth-oriented initiatives (Family 3). Buyers who did not work with IT consulting companies hired strategy-consulting firms to conduct studies for them and to help them make decisions. In the MC-OPTIC case for instance, BCG (Boston Consulting Group) was mandated. In the other growth-oriented initiatives, high rank partners at IBM and Accenture consulted the buyers on strategic issues and their work was combined with consulting, and frameworks from specialized firms like Gartner and Forester. Here is what the CIO in the MC-OPTIC case said about the role of BCG:

> *We outsource these types of issues, for example they will conduct an accurate study of the comparative evolution of the markets, technologies and competition for China, and the BCG is very good.*

Table 5-72 Excerpts for Strategy Consultant Role in Family 3

Project	Examples from interviews
DDS-THEME PARK	- *The consultants simply helped us for a framework of the problem.* - *What is important for us is to know that they understand the issues really well.* - *I am also interested in firms like Gartner and Forester because they give frameworks in IT Governance and IT Management and they also provide operational business frameworks.*
MC-OPTIC	- *We do hire strategy consultants and in this initiative we hired the BCG. These are really strategy consultants so they help you for example determine how to penetrate a certain market, understand the situation in France as opposed to other countries, or structure a new department.* - *We hire a team from BCG to know what were the possible rhythms; to analyze the real production capabilities of the machine manufacturers and to know at what rate the technology would develop.*
PLM-ENERGY	- *There was a small engineering company hired for its expertise in the 3D domain and who acted like a strategy consultant. A person from the consulting company was on the committee to help the client make decisions from a technological perspective.*

Strategy consultants had a smaller role in mixed and efficiency-oriented initiatives. Nevertheless, the buyers extensively bought and used frameworks and methodologies to identify their needs and to frame the problem. In two cases (BASEL II-BANK and CRM-ENERGY), frameworks were bought from PWC (Price Waterhouse Coopers) who also conducted studies and ad hoc consulting work. In the BASEL II-BANK case for instance PWC was hired to help the bank implement the practices and capabilities needed to obtain the Basel II certification. PWC worked out an action plan with 50 initiatives to close the capability gap.

Table 5-73 Excerpts for Strategy Consultant Role in Family 2 and Family 1

Project	Examples from interviews
ECM-DEFENSE	- *We created an RFP and got proposals from several strategy consulting firms and we ended up selecting one.*
BASEL II-BANK	- *Our company hired a strategy consulting company to identify the needs of the business for BASEL II. They looked at what the company was missing and this unfolded into a portfolio of 50 initiatives.*
PLM-AEROSPACE1	- *This was almost like an education and the software vendors had good consulting and good ideas of where we should go and where the technology readiness was at that point.*
CRM-ENERGY	- *We bought from PWC the worldwide Best Practices in the Utilities industry.* - *We got ad hoc consultants form PWC.*
CRM-RESORTS	- *We hired people from the two major research firms in IT, Gartner and Forester, who were able to help us on a strategic level and who are keeping us up to date with the evolution of the market.*

The results for Vendor Role are weak in growth-oriented initiatives (Family 3) for two reasons. First, in the MC-OPTIC case there was no vendor involved and the core application was developed inside the company, and second because the co-innovation relationships and partnerships in the DDS-THEME PARK and PLM-ENERGY initiatives were between the buyer and the IT consultants (as opposed to the vendor). The IT consultant was always the intermediary

in these initiatives and the vendors like Dassault Systèmes were less implicated in the strategy and innovation discussions. The sub-theme is much stronger is mixed initiatives because buyers interacted more frequently with the vendors. Additionally, several vendors were involved in these projects.

Table 5-74 Excerpts for Vendor Role in Family 2 and Family 1

Project	Examples from interviews
PLM-AEROSPACE1	- *Dassault is in the business of seeing as many roadmaps as possible, picking up the features and bonding them into a new version.* - *So their roadmap exercise is first looking across all of their different domains to see where the industry in general is headed and then speaking to their major clients and finding out what are their requirements, where is that common layer? Because obviously they benefit by developing the system, you know they could sell it to [us], Bombardier and Bell, all the better: that helps them. If they can only sell it to [us] because it's so specific, they're usually less motivated.*
ECM-DEFENSE	- *They are willing to invest because this is a big deal for them although they are amongst three or four other companies responding to the RFI because of the scale of the project, because our company is an international reference and also because the contract represents guaranteed future sales of licenses in the future.*
CRM-RESORTS	- *I worked with Web agencies and vendors who were in the website design business. We were working closely with the people in charge of the Look and Feel and the Marketing people.*
CRM-ENERGY	- *Our objective was to improve our processes so we took the Utility Process Model provided my SAP and we analyzed what had to be done for each sub-process.*

The fourth sub-theme (Expert Role) was only brought up in growth-oriented initiatives (Family 3). A good example of experts is the INRIA (Institut National de Recherche en Informatique et Automatique) in France with whom the buyer in the MC-OPTIC case collaborated extensively. Here is what the CIO said about his relationship with the INRIA:

> *We worked with the specialists of the optimization of complex algorithms at INRIA. The institute contributed substantially with very powerful optimization systems for our algorithms.*

In short, the role of strategy consultants increases when innovation increases. In less innovative initiatives, IT managers buy methodologies and frameworks from strategy consulting firms and are less likely to engage in long strategy discussions. When projects are highly innovative (Family 3) and IT consultants are hired, their involvement becomes extensive given the opportunities these projects open up for them. The lower involvement of vendors in highly innovative initiatives is explained by the aggressive control IT consultants are seeking in these

projects and by their position as intermediaries in the co-innovation process. Finally, experts like research labs are used more often in growth-oriented initiatives (Family 3).

iii) Outsourcing / Externalization

This theme reflects the way IT activities are externalized or outsourced throughout the IT initiative. The theme occurred in 100% of the cases and accounts for 14% of all Inter-Organizational Governance themes. The theme reflects the division of labor phenomenon in the IT industry that leads users of IT systems to externalize and outsource a large part of their IT activities, especially software development. General approaches and rules used by IT managers in managing the externalization and outsourcing processes are covered here.

The importance of externalization and outsourcing is almost equal in efficiency-oriented initiatives (Family 1) and growth-oriented initiatives (Family 3). The theme is more intensive in mixed initiatives (Family 2).

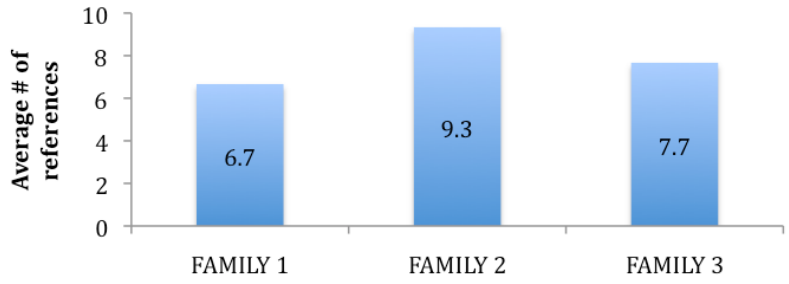

Figure 5-42 Scores for Outsourcing / Externalization in Inter-Organizational Governance

In growth-oriented initiatives, even the core application in the MC-OPTIC case had a major Outsourcing / Externalization component. The CIO keeps the strategic core knowledge and competences inside his organization while he outsources all the development work:

> *For development work I use external resources but the project itself, project management, the functional competences entailed, is done here.*

In the DDS-THEME PARK case, the question was not about whether activities had to be outsourced or not but instead about the level of implication of each party (and the level of externalization) for each IT activity. In this case the CIO makes sure that about 80% of people who work on new projects come from the outside and 20% from the inside and the opposite for recurrent support activities.

Table 5-75 Excerpts for Outsourcing in Family 3

Project	Examples from interviews
MC-OPTIC	- *In my development activities I work with external resources but the management of the project and the functional competencies in the project are kept inside.* - *Outsourcing has become fundamental for us. We focus internally on our core applications and what we really want is the management of projects and the functional competencies. I do not have internal developers anymore; I only hire third parties.*
DDS-THEME PARK	- *We innovated in the development phase. The development was done offshore and up to 30 development people were working for us at Accenture in the Philippines.* - *In projects, 80% of the staff is external and 20% is internal and the opposite for recurrent activities.*

Here is a very good example of rules used to address Outsourcing / Externalization issues explained by one of the CIOs in mixed initiatives (Family 2):

> *You only outsource for one of 3 reasons: (1) give your problems to somebody else, (2) give your problem to somebody who can achieve a scale or cost effectiveness that you cannot hope to achieve because they have scale that you can't get to, or (3) you see it as truly non strategic and you want to focus limited resources on strategic issues so you give them something that's non strategic, and you know that there's a cost to do that but it's a cost you're willing to pay.*

Respondents in mixed initiatives emphasized their outsourcing relationships with vendors (as opposed to relationships with IT consultants in growth-oriented initiatives). Excerpts for the theme in Family 2 are presented in the following table:

Table 5-76 Excerpts for Outsourcing / Externalization in Family 2

Project	Examples from interviews
PLM-AEROSPACE1	- *We used to have within [the company] a huge IT organization, a couple of hundred people. A few years ago we realized, yes they are important to running the business but they are not the strategic advantage. So our whole IT organization, as many other have done, is outsourced.*
ECM-DEFENSE	- *All these systems are currently managed and maintained by our outsourcer that happens to be a subsidiary of the group is an SSII (Société de services en ingénierie informatique) that competes with other firms lie EDS, IBM, Capgemini, Atos in France, etc.* - *We often outsource to small consulting firms.*
BASEL II-BANK	- *We did not want to be dependent on one supplier. Our goal was to choose the best solution for each business need whether this solution came from inside the firm or from outside. These firms would have guaranteed some sort of objectives but we were not comfortable with the approach.* - *The goal was to get the specialized expertise because we did not believe that a single firm could have a good overview of the problems. So we keep the control internally but we get the specialized expertise.*

According to one of the respondents in the PLM-AEROSPACE1 case, PLM systems are too complex and too expensive to build internally:

> *New generations of software are becoming more complex so today to develop a full-fledged PLM system it will cost you probably 500 million dollars so you cannot afford it. 20-30 years ago, yes, you could have developed your own software, because it was smaller, simpler, and there were no real commercial solutions.*

In contrast with growth-oriented initiatives (Family 3), respondents in efficiency-oriented initiatives (Family 1) made sure there were more people involved from the inside of the organization. Here is what one of the respondents in Family 1 said:

> *We were very careful about this so we wanted to maintain a 70/30 ratio, 70% employees and 30% consultants.*

Also, in efficiency-oriented initiatives, all buyers chose to hire large IT consultants (like Accenture and Capgemini) to integrate their new CRM and ERP platforms and to whom they externalized a great deal of activities like project setup, project management and change management. Excerpts for the theme in Family 1 are presented here:

Table 5-77 Excerpts for Outsourcing / Externalization in Family 1

Project	Examples from interviews
ERP-FOOD	- *I told you about the outsourcing of our IT operations. We have very simple principles when it comes to outsourcing. First of all we have to know our core competencies, we have to keep them inside the firm and we have to develop them. Everything that is non-core is not strategic, it becomes tactic and a Make or Buy question. So tactically we either buy it from the outside because it is more effective or we do it internally because we can do it more effectively.*
CRM-RESORTS	- *I believe in sourcing which is what we know every time we get into our cars. A car is about ten or twenty companies that got together to make a car. Certain companies are in charge of the tires, some of the lighting system, others of the engine, etc. The car logo's represents all these companies combined in some way. I believe that IT systems should reach that maturity one day.*
CRM-ENERGY	- *The reason we did two different RFPs is because we did not want to end up with predetermined marriages between the vendors and the service providers.*

A common aspect seen throughout the project families is the outsourcing of development and support activities to IT service providers in cheaper offshore destinations. These development activities were outsourced for example to the Philippines (by Accenture) in both the DDS-THEME PARK case (Family 3) and the ERP-FOOD case (Family 1).

iv) Partnerships

The theme includes the joint ventures, ownership structures, complementary capabilities and risk sharing activities that characterize the relationship between the buyer and external partners (vendors and consultants) and stimulate co-innovation. This theme is one of the strongest mechanisms for collaborative and co-innovation. It occurred in 89% of the prototypes and accounts for 9% of all inter-organizational governance themes. This theme provides excellent insights into how the IT manager collaborates and co-innovates with external stakeholders and how the various forms of partnerships positively affect the absorption of new ideas and knowledge inside the company which in turn drives innovation.

The graph below suggests how the emphasis on partnerships increases with innovation. The difference found between efficiency-oriented and growth-oriented initiatives is another good indicator of the strong link between exploratory innovation and inter-organizational partnerships.

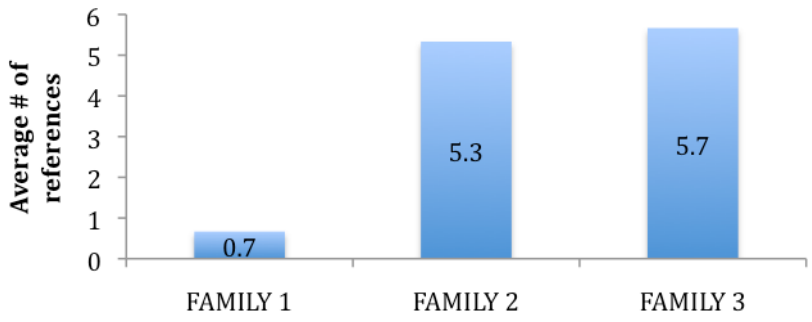

Figure 5-43 Scores for Partnerships in Inter-Organizational Governance

The theme is composed of two sub-themes: (1) Buyer-Vendor Partnerships, and (2) Joint Ventures. The former addresses partnerships with software vendors and the latter addresses partnerships with IT consultants.

The Buyer-Vendor Partnership theme is closely related to the Vendor Role theme presented earlier and the only growth-oriented initiative where a direct partnership relationship between the buyer and the vendor was found is in the EHR-HEALTH case.

The buyer-vendor relationships are intensified in mixed initiatives (Family 2) for the same reasons the Vendor Role was intensified. For instance, the buyer in the PLM-AEROSPACE1 case directly worked and collaborated with Dassault Systèmes and respondents discussed the various factors that strengthened their partnership. Some of the important factors advanced are: (1) the vendor's constant need for feedback and problems to solve in order to include more features and improvements in future version, (2) the full-time appointment of key vendor employees on site, (3) keeping a strong buy-in from the vendor, and (4) ramping-up the buyer's organizational readiness. Here is a good quote from the PLM-AEROSPACE1 case:

> *We're on the upper edge, if you look at the food chain of their clients, we're pretty high, and the smaller clients would be getting a vision just from the annual user conference. They don't have the same level of interaction.*

Table 5-78 Excerpts for Buyer-Vendor Partnerships in Family 2

Project	Examples from interviews
PLM-AEROSPACE1	- *When you're a company the size of [our company], they become a partner, they're more than just a software vendor, and they become part of your supply chain.* - *We need them and they need us. This is a partnership approach. If you're working with Autodesk, you can find AutoCAD at Bureau en Gros, on the Web and that's it.* - *We have someone on site here […] from Dassault who works full time with us. So as we work together he will communicate the strategy and vision of Dassault.*
ECM-DEFENSE	- *There is a dilemma in our relationship with the vendors because we want to get them to cooperate and we try to build a positive relationship and partnerships with them but at the same time they know that they would always be competing with other vendors and that we cannot be loyal to them.*

Also, according to one of the respondents in the PLM-AEROSPACE1 case, the partnership with Dassault and IBM did not reach the joint venture level (the type of partnership seen in growth-oriented initiatives) mainly because of their lack of organizational readiness. The company lacks the maturity and innovativeness that IBM and Dassault Systèmes require for committing in joint ventures. The buyer-vendor partnerships found in efficiency-oriented initiatives are strong but less complex and less innovative than those seen in mixed initiatives. For example, the buyer is interested in becoming a SAP reference in order to obtain special benefits and a special relationship with SAP and on the other hand SAP wants to build case studies out of their successful projects to attract buyer competitors in the same industry. This is particularly true when (1) the buyer is a leader in the industry, and when (2) the market in the industry is large and still untapped.

Table 5-79 Excerpts for Buyer-Vendor Partnerships in Family 1

Project	Examples from interviews
ERP-FOOD	- *We have a partnership Relationship with the vendor because we are considered a case of Best Practices on the SAP market. The reason is our ability to create and maintain a Unique Core Model, the way all our subsidiaries are using the same set of processes, and because everything is done in one language, the English language, whether you are in Guatemala or Russia.*
CRM-ENERGY	- *We have a long-term commitment of at least 10-15 years with the vendor.*

Joint Ventures are only found in growth-oriented initiatives (Family 3) and they especially imply IT consultants. The following two cases are the most powerful joint ventures: (1) the PLM-ENERGY case, and (2) the DDS-THEME PARK case. In the first case, IBM with the buyer and its major engineering consulting partner partnered in creating and penetrating the global market for PLM systems in the hydroelectric industry. Here is what the respondent said about this global partnership:

> *I remember a meeting a VP from SNC and we said to each other: the great thing about the understanding that we have with SNC, [the client], Dassault and IBM is that we are all ready to go international.*

In the second case, the CIO explained how his innovative partnership with Accenture allowed him to get back his money every time the innovative DDS solution was sold to someone else. Here is one of the excerpts describing the Joint Venture:

> *As founding client, I pay for the solution but if it is sold on they give me money back. It is a Joint Venture. So not only do I benefit from the business value of the project but I can recuperate part of my investment.*

In such strong partnerships, the buyer becomes a de facto reference for the IT consultant and the project becomes a success story (case study) used to attract and impress other companies in the same industry. What the respondent in the PLM-ENERGY case said:

> *We succeeded in having [the client] as a reference. They even agreed to do conferences with us. Therefore they are a reference client.*

Additionally, these joint ventures not only serve to co-create innovative applications, they also enabled the creation of new systems integration models and methodologies.

Table 5-80 Excerpts for Joint Ventures in Family 3

Project	Examples from interviews
PLM-ENERGY	- *The president of IBM Canada as well as the VP for the Americas came to demonstrate to the client and its partners that the project was important and that the investments were necessary even though it is the first company in the world to apply these PLM tools in the construction of hydroelectric dams.* - *IBM and the client innovated together in a joint venture to push the PLM tools.* - *The company became one of IBM's references and joined IBM in its global conferences.*
DDS-THEME PARK	- *As a founding client, I pay the project but as soon as the system is sold elsewhere I start getting reimbursed for the initial investment. We share some of the risks and the benefits.* - *It is a Joint Venture. Not only do we get the business value from the project but we can also recuperate a big part of my investment very quickly.* - *Exactly, it is a big bonus, an incentive for success.*

Overall, the combined results from both sub-themes (Buyer-Vendor Partnership and Joint Venture) show stronger partnerships in growth-oriented initiatives (Family 3). IT consultants dominate partnership relationships in growth-oriented initiatives while vendors dominate those in mixed and efficiency-oriented initiatives. In all growth-oriented initiatives (Family 3) where the buyer and the partner engaged in a joint venture, the external partner had a much stronger leadership role (in comparison to Family 2 and Family 1 initiatives) that could compensate any lacking internal IT capabilities (both managerial and technical) to secure the project's success.

v) Contract Management

The theme describes the contracts or SLAs used by buyers to govern their relationships with external partners and suppliers in their initiatives. It occurred in 67% of the prototypes and accounts for 7% of all inter-organizational governance themes.

The results here are interesting because contracts seem to have a positive relation with innovation. The graph clearly shows that respondents in growth-oriented initiatives (where innovation is stronger) emphasized Contract Management and formality in relationships significantly more than respondents in mixed and efficiency-oriented initiatives.

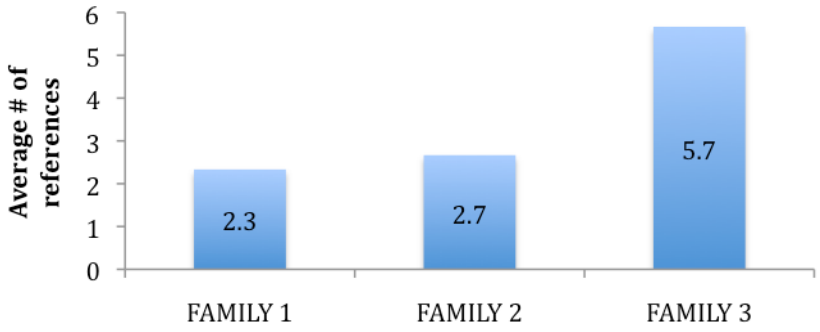

Figure 5-44 Scores for Contract Management in Inter-Organizational Governance

In growth-oriented initiatives (Family 3), respondents mentioned the contracts they signed more often than other respondents and some of them also highlighted the importance of building strong contract management capabilities to manage co-innovation relationships. In the PLM-

ENERGY case for instance a five-year contract that includes an ROI was signed. In the respondent's words:

> *We signed a five-year contract which made it possible [for the client] to enjoy a return on investment in spite of the fact [that it] does not function as a Bombardier or a Pratt & Whitney, given that it is semi-public.*

Here is how the CIO in the MC-OPITC case describes the core capability to manage contracts that he built in his IT organization:

> *Furthermore it is evolving towards contract management, especially the quality side of contracts, how we supervise them, how we monitor them, etc.*

The CIO also emphasized the importance of signing medium-term contracts instead of long-term contracts. He also explained how important it was to take the necessary time (six months to one year) to build high quality contracts with external partners.

Table 5-81 Excerpts for Contract Management in Family 3

Project	Examples from interviews
MC-OPTIC	- *It is evolving more and more towards contract management especially with the quality of contract issues, how we monitor and track contracts, etc.* - *It is not that important for us on the long-term, it is important over a period of 3-5 years, on the medium term. The qualification and contracting phase is really important and you have to take your time to do it right. In general, when we try to outsource an activity it can take from six months to one year.*
PLM-ENERGY	- *On a contract level, after IBM invested a million dollars, we told the client they would saved a lot of money in their current hydroelectric projects like Eastmain, Rapides-des-cœurs and Chute-Allard. These projects are almost entirely done with the Dassault products.*
DDS-THEME PARK	- *I contract an integrated solution for the package in an ASP (Application Service Provider) mode.* - *The second stage is to build with Accenture a new booking engine on the Web. There's a new dialogue, a technological innovation, rich content, an innovative way of sourcing in an ASP mode, etc. The idea is not to invest in a new infrastructure or a new custom-made application that I would use alone. I ask for a Software-as-a-Service (SaaS) contract and Accenture will maintain the software and make it evolve for us and all their other clients. Therefore, I am hosted and the system evolves.*

Only one respondent in mixed initiatives (the CIO in the ECM-DEFENSE case) emphasized contract management. According to him, there's a duality in the relationship with partners that needs to be carefully addressed. In his words:

There is this duality if you want: to cooperate while respecting a degree of formalism and a compartmentalization of the information.

In efficiency-oriented initiatives, the CIO in the CRM-RESORTS case highlighted the importance of not becoming too loyal to a supplier, not promising long-term contracts, and not discussing issues that fall outside of the contracts. On the other hand, the CIO in the ERP-FOOD case emphasized two characteristics in his program management contract with Accenture: (1) the specification of consulting profiles, their roles and competences, and (2) the incentives and penalties used to control budgets.

Table 5-82 Excerpts for Contract Management in Family 1

Project	Examples from interviews
CRM-RESORTS	- *I am incapable of being completely loyal at all times to a supplier and I cannot fully commit with any particular supplier. In other words, when I speak with a supplier it is only in the framework of a specific contract using a high level of formalism.*
ERP-FOOD	- *A Program Management contract is essentially a contract of consulting profiles needed for the implementation of the new system.*

The results show that firms combine explicit short-term contracts with implicit long-term agreements. This is particularly true in growth-oriented and mixed initiatives where the implicit is more important. These implicit agreements are also reflected in both the Partnerships theme (seen earlier) and the Social & Personal Contacts theme (seen later).

In growth-oriented initiatives, formal contracts are short-term, but when people trust each other they implicitly know the relationship will last on the long run. These short-term formal contracts are typical in growth-oriented initiatives because of the high uncertainty associated.

IT managers also use contracts to structure and formalize their external relationships with vendors and partners to secure the short-term and ongoing delivery of innovative modules. There's a general tendency to limit changes and innovation in a project's module to reduce the disruption, delay, and instability of a deliverable. As previously seen in the intra-organizational governance section, disruption or delay of a deliverable has negative effects on trust and the relationships in projects, especially the internal relationships between IT and the business

managers who can loose motivation when kept waiting too long for the promised applications and features.

In efficiency-oriented initiatives, buyers define the boundaries of innovation at the front-end of initiatives, before contracts are signed, roadmaps developed and commitments made. When the application in question impacts a large number of users in the business, the risk attached to introducing innovations in the project increases. In the ECM-DEFENSE case for instance, given the project's large-scale impact on the company's 70,000 employees in six functional departments and six countries, innovations can scare managers because of the heavy additional costs and delays they entail. Adding, changing or removing functionalities that have an impact on business processes and necessitate changes in business cases trigger a wide-range of additional work: new studies, re-negotiations with business managers, re-negotiations with consultants and vendors, etc. The boundaries of change and innovation are thus clearly set in these projects from the beginning inside the contract. Typically the allowed change is set to 5% in ERP, CRM or ECM applications.

vi) Adopting Applications

This theme addresses issues surrounding the adaptation of commercial applications and their innovative adoption in the organization. The theme occurred in 56% of the prototypes and accounts for 5% of all inter-organizational governance themes.

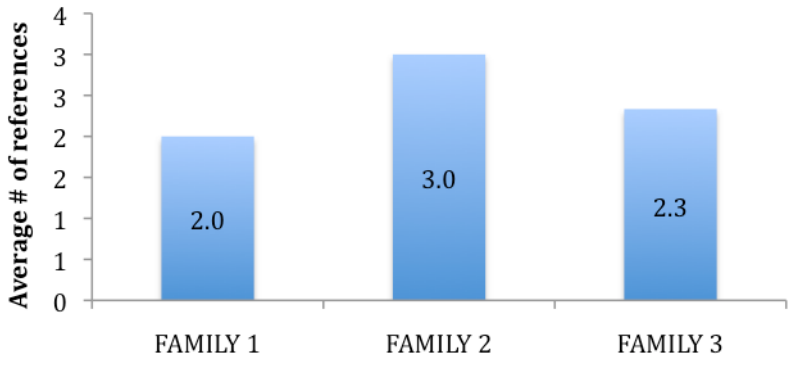

Figure 5-45 Scores for Adopting Applications in Inter-Organizational Governance

The issues surrounding the adaptation of external applications and their creative adoption are important in both mixed and growth-oriented initiatives because the adaptation work is a central part of the contract and because buyers have succeeded in convincing the vendor and consultants to integrate the needed functionalities and features inside the black box. Vendors would not adapt their products to the buyers' needs if these needs were not shared by a substantial number of potential clients. But the buyer will surely benefit earlier from these functionalities and in turn benefit from a leadership position and competitive advantage. Here is what the respondent in the PLM-ENERGY case said:

> *We needed to have a strong Out-of-the-Box vision for the system while making sure everything was done in French. We had to adapt or translate all the nomenclature for example. We did not personalize the system; we adapted it.*

As previously discussed, the division of labor in the IT industry and the specialization of vendors make it really hard for users to keep developing their applications internally. For example, in the PLM-AEROSPACE1 case, the respondents explained that they decided to externalize their application development capabilities to vendors like Dassault and SAP because these capabilities were no longer creating any competitive advantage. One of the respondents compared the company's decision to Toyota's decision to replace its proprietary CAD system in the automobile industry. One of the respondents in the PLM-AEROSPACE1 case (Family 2) explains why they were determined to ban customization:

> *If you take a software and completely match it to your existing process, you're doing a lot of work for nothing and you're making your future life very difficult because then you can't upgrade, you can't take advantage of new features, etc.*

Another respondent in Family 2 explains how he creatively adopts the commercial software while keeping the black box closed:

> *Time will tell whether I'm successful at it but that is what our principle is: buy the newest robust, stable and cost-effective system and then use it the heck out of the box. Exploit it out of the box but leave it in the box.*

A key finding here is the IT manager's capability to optimize the adoption of commercial solutions and to still make their usage a powerful competitive advantage. According to the respondents in the PLM-AEROSPACE1 case, the fast adoption of new commercial releases and functionalities is a crucial competitive advantage but even more important is the timing of adoption. Certain modules or functionalities are not mature enough to create value if adopted so the option of waiting for the module's maturity to increase is very beneficial. Here is what one of the respondents said:

> *What we're seeing is: it's faster but at the same time not so fast. We're dealing with systems here that are not totally mature. So what you want as a buyer is to go at a right pace. If you're 4-5 years too early it will cost you a fortune to get the results. If you're too late, then other competitors will have already improved their processes. Timing is critical in terms of technology maturity, as well as how you do it.*

Table 5-83 Excerpts for Adopting Applications in Family 1

Project	Examples from interviews
CRM-RESORTS	- *We are innovating by effectively using our IT energy and capacity. In all organizations in the world about 20% to 50% of the IT energy is dormant in a closet. People do not use it because they are not trained or because since the last training half the team has changed.* - *With only some adaptation an ERP implementation works well because the following version is easily implemented.*
ERP-FOOD	- *We kept some specificity in the system and we had to adapt a certain part because the two sponsors I mentioned earlier insisted but they had good reasons to do so.* - *The logic of standards is super simple. We want all subsidiaries to gradually evolve into the standard tools of the business. If a subsidiary likes a tool it's been using for a while that is not one of our standard tools, but if it works well and is not too expensive it can keep it. However, if ever it needs to change the tool for any reason, broken, stolen, too expensive, then it would have to evolve toward the standard tool. This creates a convergence over the years in our worldwide applications.*

In general, buyers use commercial applications as black boxes and do not play with the code and change it to ensure the quick integration of new releases and updated versions. The concepts in the Adopting Applications theme complement the ones in the Influencing Vendor Roadmaps seen below. The only smart way for buyers to adapt the commercial solutions to their needs is actually to influence the vendor roadmaps and to get them to integrate the needed features in future releases.

vii) Influencing Vendor Roadmaps

More and more users and buyers of IT systems are now seeing and understanding the dynamics of IT innovations and the underlying division of labor that created the large industrial software vendors like SAP and Dassault Systèmes. Some of the leadings users of IT systems (researched here) are able to adapt to the new rules of the game while maintaining a critical role in the IT innovation process. Buyers have built the capability to influence vendor roadmaps and in turn to keep using IT as a competitive advantage.

The theme occurred in 44% of the prototypes and accounts for 5% of all inter-organizational governance themes. The graph below shows that IT managers did not influence their vendors' roadmaps in efficiency-oriented initiatives (Family 1) but they did in mixed and growth-oriented initiatives.

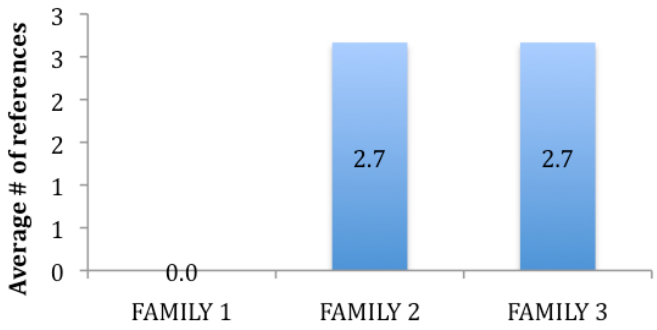

Figure 5-46 Scores of Influencing Vendor Roadmaps in Inter-Organizational Governance

The theme was very clearly described by the CIO in the DDS-THEME PARK case. Here is a very simple excerpt from his description:

We are obliged to be intimate and influence the Roadmaps of such publishers.

Table 5-84 Excerpts for Influencing Vendor Roadmaps in Family 3

Project	Examples from interviews
DDS-THEME PARK	- *In all modesty, we are known for making our partners advance and progress. We are leaders in our industry and we are very demanding customers. However, this does not mean that we can strangle our vendors economically.*
PLM-ENERGY	- *The company is the first in the world to apply these PLM tools in the construction of hydroelectric dams. The new knowledge would give IBM and Dassault access to a new profitable market and is thus critical for their growth plans.*

In the PLM-AEROSPACE1 case for instance, the buyer has the capability to influence the roadmaps of its PLM vendor, Dassault Systèmes, to its own advantage. The company influences the vendor's roadmaps while ensuring a flawless integration of new releases. The ability to influence its partners is a function of the buyer's leadership in its market and its large investments in innovation and R&D. The buyer considers itself very high on the food chain of Dassault's customers. According to one of the respondents interviewed, the level of interaction between the company and Dassault is really high in comparison to other customers. Here is a quote that clearly illustrates the theme in the PLM-AEROSPACE1 case:

> *We're actively working with them helping to define what their future software releases will look like. The benefit is the capability to influence the direction of the solution.*

Table 5-85 Excerpts for Influencing Vendor Roadmaps in Family 2

Project	Examples from interviews
PLM-AEROSPACE1	- *We're actively working with them helping to define what their future software releases will look like. The benefit is the capability to influence the direction of the solution.* - *Another thing we take into consideration here: some of these enhancements that we're asking Dassault to do, we could develop software to get around it ourselves but you don't want to do that because (Hall: well, we're not a software vendor) and when these products are upgraded, then it all breaks down. So you want to have very strong partners.*
BASEL II-BANK	- *They were also trying to learn from the project. We were also amongst the first banks to react to the new Basel rules and to the AMF interpretations of these rules.*

A key finding here is the way high performance CIOs have the ability to highlight the unique complexity and knowledge intrinsic to their organization that attracts and motivates external consultants and vendors. In some way, these IT managers put in place the right incentive mechanisms that stimulate the creativity of their external partners and allow for ongoing co-innovation. In more innovative initiatives (Family 3 and Family 2), vendors are more attracted by their client's organizational complexity in which they see opportunities for innovating in their

products and solutions. These highly innovative initiatives influence the partners' roadmaps in a serious way (whether the partner is a vendor or consultant). Complexity increases the chances of integrating all the solutions and functionalities (in a flexible bundle of modules) needed by most other players in the industry. The idea is simple. If the tool solves the leader's problem it will probably solve the problems of the other firms in the industry. Here is how the CIO in the DDS-THEME PARK describes the positive effect of complexity:

> *There are […] leaders in their fields, niche players, which have a vested interest either in Labor Scheduling or in Time Charting, etc. to work with [us] because they are aware of complexity and that if it works [here] there are chances that it will work elsewhere.*

Most initiatives in mixed and growth-oriented cases strongly influenced the roadmaps of the IT partners especially the highly innovative initiatives in Family 3. The IT partners here are companies like Accenture, IBM, Dassault Systèmes, and Purkinje.

A major issue here is the way the co-innovated system could capture some of the company's core and unique knowledge and capabilities and the security and IP sharing problems that culminate. However since the data that a company holds and processes with its IT systems are more valuable than the system itself, these IP issues are sometimes reduced. According to one of the respondents in Family 2, understanding the data that flows in the system is more important than the system itself. However, this does not mean that the buyer is giving away its knowledge to the competition for free first (1) because the major competitive advantage is in the data (as opposed to the system) and (2) second because the buyer will always be a little bit ahead in the race.

viii) Social & Personal Contacts

This theme reflects the way social contacts and past relationships affect the decision-making process in the relationship. The theme occurred in 44% of the prototypes and accounts for 2% of all inter-organizational governance themes. The results show that social and personal contacts are more important in growth-oriented initiatives.

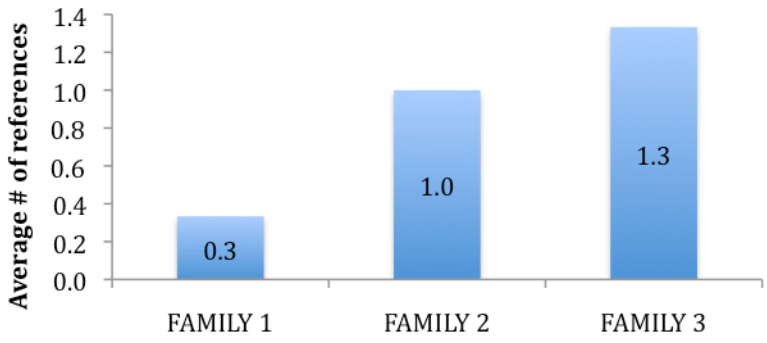

Figure 5-47 Scores for Social & Personal Contacts in Inter-Organizational Governance

The CIO in the DDS-THEME PARK case uses an approach he calls Intuitu Personae for selecting specific profiles from Accenture. People he trusts and knows and who have a positive track record:

> *Part of our contracts were Intuitu Personae, we worked with Accenture but we said that we wanted Mr X, Ms so and so, etc. we do not always want all five but we always want three out of the five, the ones with the knowledge.*

In the PLM-ENERGY case, the respondent used his strong personal contacts inside the buyer's organization to sell the innovative PLM approach. These strong personal contacts were critical in overcoming the uncertainties and inherent instabilities in growth-oriented initiatives.

Table 5-86 Excerpts for Social & Personal Contacts in Family 3

Project	Examples from interviews
DDS-THEME PARK	- *We use an intuitu personae method to select consultants, according to their experience and their track record. The brand name of a consulting firm is not enough for enough.*
PLM-ENERGY	- *It worked because I had good relations with the client and good contacts. I contacted these people and showed them the interesting things IBM could offer with its integrated PLM approach.* - *We were lucky because we had people on the initial team who had previously worked several years with the client and who understood the client's structure.*

The theme in mixed and efficiency-oriented initiatives is very different. Respondents saw personal contacts as threats instead of benefits. Here is for instance what the CIO in the ECM-DEFENSE case said about personal contacts:

We also insisted on respecting the chain of contacts in order to avoid contacts outside the official channel.

Table 5-87 Excerpts for Social & Personal Contacts in Family 2 and Family 1

Project	Examples from interviews
ECM-DEFENSE	- *Never forget that it is your duty to respect the confidentiality of the information processed and of what you hear. There is only one communication channel. This issue is repeated and reminded to everyone at the beginning of every presentation in the project.*
CRM-RESORTS	- *I was a supplier for a few years and I can tell you that things have changed now and a supplier cannot expect to charge 20% more just because we know each other. This does not exist anymore.*

The Social & Personal Contacts theme is also closely related to the Partner Selection Process theme (seen earlier).

ix) External R&D Role

The use of external R&D and knowledge is at the core of the open innovation paradigm. The External R&D Role theme reflects the role of external organizations that provide critical knowledge to build the innovative application.

The theme occurred in 22% of the prototypes and accounts for 2% of all inter-organizational governance themes. There was no reference to any external R&D in efficiency-oriented initiatives.

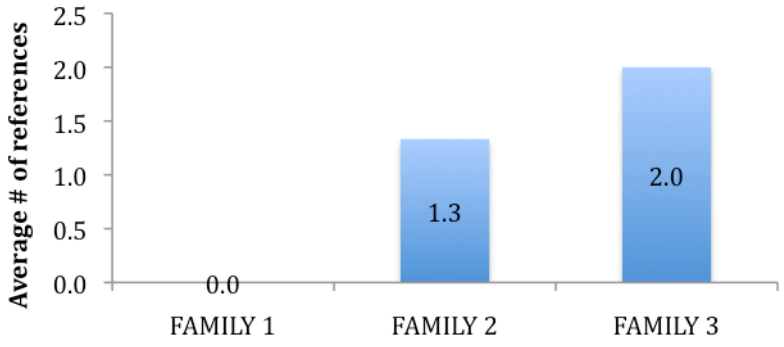

Figure 5-48 Scores for External R&D Role in Inter-Organizational Governance

In the MC-OPTIC case for instance, the company works with research organizations that are not necessarily in the field of optics. Knowledge from other scientific fields created outside the company is combined with internal R&D knowledge and then translated into IT systems. In the CIO's words:

> *Increasingly, such research involves a search for partnerships because we need science and technologies that are not uniquely for optics.*

Table 5-88 Excerpts for External R&D Role in Family 3 and Family 2

Project	Examples from interviews
MC-OPTIC	- *We have research activities in common with universities and research institutes like the CNRS.* - *The thin-films that enable us to make anti-refractive lenses are the same technologies used in the nuclear, defense and electronic industries.*
ECM-DEFENSE	- *The small businesses that we work with have large returns on small investments so we have the ability to build a relationship with them that would push them to innovate. They are also constantly providing new ideas and best practices from the industry.*

The only respondent who directly addressed the importance of external R&D and knowledge is the CIO in the ECM-DEFENSE case. According to him, the only external knowledge that had an impact on the new system's innovation is the knowledge that small and specialized suppliers could introduce in the project.

x) Regulations

Results do not indicate any variation for this theme between growth-oriented and efficiency-oriented initiatives. The theme occurred in 22% of the prototypes and accounts for 2% of all inter-organizational governance themes.

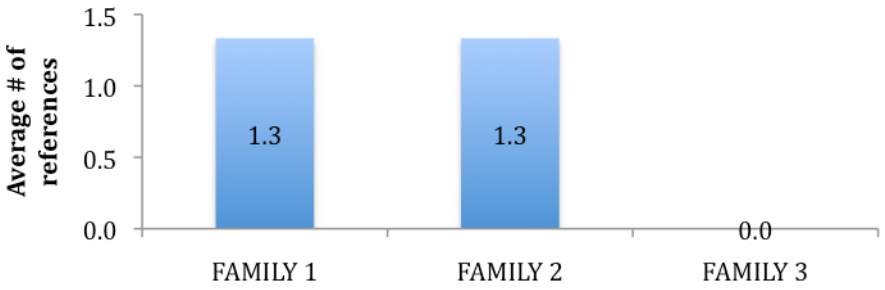

Figure 5-49 Scores for Regulations in Inter-Organizational Governance

The results show that overall regulations have weak links with strategic IT initiatives whether these projects aim for innovation or efficiency. In growth-oriented initiatives, the theme did not occur at all in any of the three prototypes. Regulations in mixed initiatives are more important because part of the studied firms is in the financial industry, which is highly regulated. Additionally, the BASEL II-BANK project was initially triggered by new international legislation in the banking sector. One of the respondents explains how the AMF (Autorité des Marchés Financiers) regulates the acquisition process in his project:

> *They approve the acquisition of the company. But quite frankly part of the bureau process is: we have to give them our integration plan because of course they do not want to see customers mistreated because we don't know what we're doing.*

Table 5-89 Excerpts for Regulations in Family 2 and Family 1

Project	Examples from interviews
BASEL II-BANK	- *The local regulatory authority applies the international regulations in the national context. In our case the AMF in Quebec adapted the international BASEL II regulations to the context here in Quebec.* - *The AMF in Quebec is a small team and they were waiting for the Canadian authority to adapt the regulations first but the federal agency did not want to work and share on a provincial level. However, we had to move forward with the project and we couldn't wait for the AMF to come up with the new regulations.*
CRM-ENERGY	- *We are regulated by the energy board, the Régie de l'Énergie, of Quebec. The board monitors all projects above $10 million.*

The results show us that regulations have an impact on a project when the buyer's industry is highly regulated. Thus, the theme has a neutral relation with innovation.

5.3.2 Secondary inter-organizational governance themes

Eight secondary inter-organizational themes emerged at the end of the qualitative analysis process: (1) Professional Associations, (2) Applications Knowledge, (3) Client's Role, (4) Consultant's Sales Capability, (5) Challenging Consultants, (6) Exchange Groups, (7) Engineering Consultant Role, and (8) Switching Costs. The table below shows where and to what extent each secondary theme occurred in the cases:

Table 5-90 Scores of the secondary inter-organizational governance themes

Inter-Organizational Governance (secondary themes)	1: CRM - ENERGY	2: CRM - RESORTS	3: ERP - FOOD	4: BASEL II - BANK	5: ECM - DEFENSE	6: PLM - AEROSPACE1	7: DDS – THEME PARK	8: MC - OPTIC	9: PLM - ENERGY	**TOTAL**	**% OF CASES COVERED**
1: Professional Associations	0	1	0	0	0	0	2	0	0	**3**	**22%**
2: Client's Role	0	0	0	0	0	1	0	2	0	**3**	**22%**
3: Consultant's Sales Capability	0	0	0	0	0	0	0	0	5	**5**	**11%**
4: Challenging Consultants	0	0	0	0	0	0	3	0	0	**3**	**11%**
5: Exchange Groups	0	0	0	0	0	0	3	0	0	**3**	**11%**
6: Engineering Consultant Role	0	0	0	0	0	0	0	0	3	**3**	**11%**
7: Applications Knowledge	0	0	0	0	0	1	0	0	0	**1**	**11%**
8: Switching Costs	0	0	0	0	0	0	1	0	0	**1**	**11%**
TOTAL	**0**	**1**	**0**	**0**	**0**	**2**	**9**	**2**	**8**	**22**	**56%**

The following figure shows the results for each secondary inter-organizational governance theme in every project family.

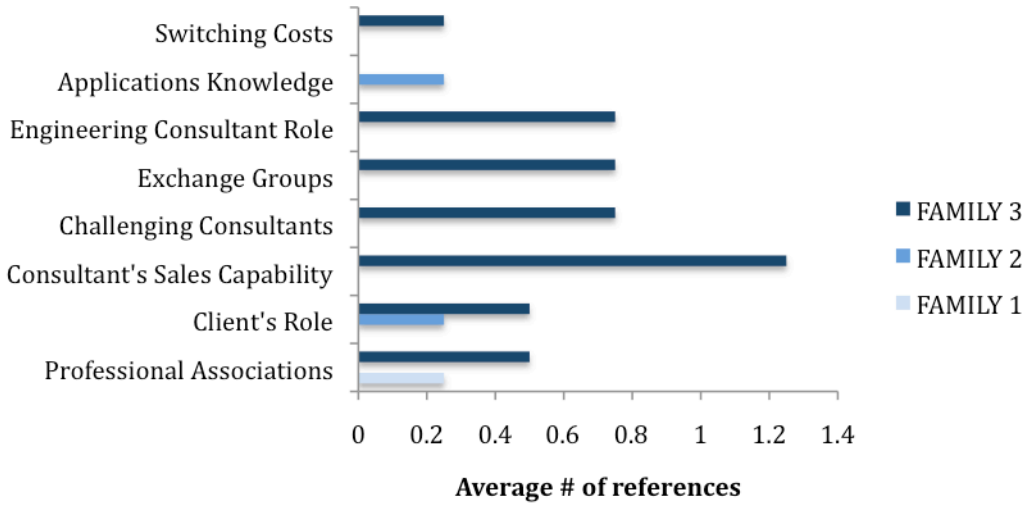

Figure 5-50 Scores of the secondary Inter-Organizational Governance themes

The first observation when looking at the above chart is the strong presence of secondary (and rare) inter-organizational governance themes in growth-oriented initiatives (Family 3). A possible deduction is the positive relationship between these external secondary themes and innovation. The relationship is even more likely when the theme only occurred in growth-oriented initiatives. The results here reflect the broader issues and alternatives that IT managers face when looking at the outside of their organization as opposed to the inside. There are eight different secondary themes in the Inter-Organizational category and only five different themes in the Intra-Organizational category (presented earlier in the study).

i) Professional Associations

One respondent in every project family brought up professional associations but the respondent in growth-oriented initiatives mentioned a larger number of associations that had an impact on the project. The CIO in the DDS-THEME PARK case referred to 3 different associations, the IT Governance Institute, the CIO Executive Board and the CIGREF (in Paris), while the other two CIOs referred to only one association each.

ii) Client's Role

This theme reflects the extent to which the innovative IT initiative creates value for the buyer's client and the way this client has a voice and role in the choices made in the project. The client has a more important role in BtoB relationships and especially when he represents a large percentage of the supplier's sales (the supplier here is the system buyer). One of the respondents in the PLM-AEROSPACE1 case clearly explains how his organization is pushed to follow the footsteps of its major client when it comes to PLM:

> *Now actually we become an extension of their aircraft development, so we're developing in a digital mockup environment. The supply chain has now been extended to the point where we're an arm of them, we're no longer just a supplier, we're an integrator.*

iii) Consultant's Sales Capability

This theme was only emphasized in the PLM-ENERGY case in growth-oriented initiatives where IBM sold its PLM platform to the buyer through three iterations:

- Convincing senior management and finding a sponsor
- Convincing the client's large network of engineering consulting firms
- Convincing the IT department and training the IT team on the new platform

IBM invested over $1 million in the proof of concept (prototype) before guaranteeing the contract because of the strategic importance of the project for its PLM business and the account manager aggressively used his personal contacts at the buyer. The leadership of the PLM project was initially in the hands of IBM and the buyer accepted the strong influence of IBM and was able to use IBM's motivation to accelerate the development of its PLM platform.

iv) Challenging Consultants

This theme is one of the IT competences identified in the IT Roles & Competences theme in Intra-Organizational Governance. This particular IT competence was only brought up in growth-

oriented initiatives (Family 3). According to the CIO in the DDS-THEME PARK case, the capability to challenge consultants is determined by the external reach of the IT organization and its relationships with associations and exchange groups enabling the constant absorption of trends, practices and new technologies. Additionally, the CIO enhances this capability by constantly recruiting people who worked several years as consultants.

v) Exchange Groups

Three types of Exchange Groups were brought up: (1) exchange groups with other subsidiaries (in different markets) in the same company, (2) exchange groups with other companies in the same industry, and (3) exchange groups with professionals who address similar issues in other industries. The latter are created through active memberships in key associations like the CIGREF (Club Informatique des Grandes Entreprises Françaises).

vi) Engineering Consultant Role

The Engineering Consultant Role theme was kept here to showcase a unique example of a project (PLM-ENERGY) where the buyer pushed its major engineering-consulting partners to collaborate in an open innovation fashion. In this particular project, the business knowledge required to build the PLM tool was mostly inside the buyer's engineering-consulting partners like SNC-Lavalin. The theme has strong connections with the External R&D theme presented earlier. The core engineering-consulting partner, SNC-Lavalin, worked closely with the buyer and IBM after the Joint Venture agreement was signed and after all IP-related issues were addressed. The larger number of stakeholders in this project and the complex IP issues in question increased the need for collaboration mechanisms and the direct involvement of senior managers. The collaboration work required for the co-innovation process to work effectively and for the parties to quickly address the IP issues was ensured by the buyer's central position as its role as the project's sponsor.

vii) Applications Knowledge

The theme is an indicator of the respondent's knowledge of external commercial applications, their strengths and weaknesses and more importantly the contexts in which they were initially created and developed. The factor can also reflect the effectiveness of the IT manager's decision-making process when it comes to selecting vendors and commercial solutions. Understanding the context in which an application was developed helps CIOs make better choices. This is probably less critical when selecting standard CRM and ERP applications. Not surprisingly, the theme was not brought up at all in efficiency-oriented initiatives.

viii) Switching Costs

This last secondary theme was only mentioned once in one case. The theme reflects the importance of evaluating the cost and ROI implications before switching from one application to another. The theme is probably more critical in growth-oriented initiatives (Family 3) where buyers favor BOB approaches and component-based architectures. In such environments, applications are more numerous and they evolve more rapidly.

PART 3: DISCUSSION AND CONCLUSIONS

CHAPTER 6: FINAL MODEL AND MAIN RESEARCH RESULTS

In the three previous chapters, three analysis phases presented the results of three qualitative analysis techniques used in combination (coding using Nvivo, typological analysis, and content analysis) to examine and compare the strategic IT initiatives. In Chapter 3, the results of the coding (categorization) process, which led to the creation of the second intermediary model, were presented. In Chapter 4, a two-dimensional typology of innovation (opposing exploratory to exploitative innovation) was applied and the strategic IT initiatives were grouped in three distinct families of strategic IT initiatives: (1) efficiency-oriented (2) mixed, and (2) growth-oriented. Then, prototypes were selected for each family of IT initiatives. In Chapter 5, the governance systems (architectures of governance mechanisms) used in the families of IT initiatives were explored and a large number of distinctions and nuances in the ways senior IT managers govern their strategic IT initiatives were discovered.

The research results show that important distinctions exist in the governance systems (architectures) used by senior IT managers to address their strategic IT initiatives according to the type of intended innovation or change. Each one of the two opposing types of innovation, or ways of creating value, (exploratory and exploitative) is characterized by a different set of contextual elements that shape the type of governance architecture used by the senior IT managers. These distinctions in governance are mainly driven by the stronger and more collaborative inter-organizational governance arrangements in growth-oriented initiatives. Last, the family of mixed initiatives that combines features of both efficiency-oriented and growth-oriented initiatives is harder to compare to the other two families because of its hybrid nature. Hence the final results presented in this section and in the final research model are limited to the efficiency-oriented and growth-oriented initiatives that are very distinctive from a governance perspective.

The results show that firms can create value by effectively governing their strategic IT initiatives for both efficiency and growth. Instead of only launching IT initiatives for scale and efficiency (affecting their bottom line), firms launch IT initiatives to build innovation capabilities, create new markets, and grow their business (affecting their top line). More importantly, to manage these strategic IT initiatives for innovating (as opposed to increasing efficiency), the findings show that as firms seek to grow and create markets, more intense and elaborate governance systems are used. This challenges and expands the narrow view in the IT literature that largely associates IT governance to compliance, cost control and value creation through efficiency.

The results also indicate that instead of using a one-dimensional governance system (focused on the intra-organizational relationships) as the literature suggests, firms leverage both project governance and inter-organizational governance systems to manage their innovative IT initiatives effectively. Furthermore, when the IT initiative is oriented towards growth, inter-organizational governance is more important than intra-organizational governance. This is due to the use of collaborative and open strategies to build new capabilities over and above the competitive strategies used to position the firm in the IT marketplace. These open and collaborative strategies are manifested in the IT initiatives where the higher levels of uncertainty and change require higher levels of inter-organizational governance.

The strategic management of IT initiatives is the front-end of IT governance where transformational IT platforms are integrated and new IT systems are co-created in project settings, where both exploitation and exploration are needed to create value in two different ways, and where complex interactions between larger networks of stakeholders require a broader view of governance.

6.1 The contextual elements associated with two distinct ways of innovating

As presented before in Chapter 4, the two different ways of creating value in strategic IT initiatives (growth and efficiency) are influenced by two very different sets of contextual elements. Growth-oriented initiatives are characterized by higher levels of uncertainty, higher risks, evolving IT platforms, smaller investments and relationships with a broader network of

strategic stakeholders. On the other hand, efficiency-oriented initiatives are characterized by lower levels of uncertainty, lower risks, mature and stable platforms, larger investments and a smaller number of strategic stakeholders.

The following table compares the two contextual elements that characterize the dynamics of innovation and value creation for each type of strategic IT initiative:

Table 6-1 Comparing the contextual elements of the two opposing types of IT initiatives (cont'd)

Contextual element	**Efficiency-oriented strategic IT initiatives**	**Growth-oriented strategic IT initiatives**
Market	- Markets are larger and are being exploited by a number of large firms. Market studies can be conducted and data is available.	- Markets are smaller, emerging and explored by a large number of firms. Market studies are hard to conduct because of the lack of available data.
Technology	- Technologies are mature IT platforms like ERP and CRM platforms and have been tested for a number of years. - The IT platform is used in more stable domains and functions such as finance and supply-chain management.	- Technologies are emerging IT platforms or modules such as PLM platforms or systems for mass customization. - The IT platforms are used in more dynamic domains for functions such as design and product development and have more direct effects on product innovation.
Uncertainty & risks	- Uncertainty is lower because of the availability of more stable and tested IT solutions by large vendors like SAP. - Vendors and consultants provide more guarantees and work with standard methodologies for implementing the system. - The benefits and ROI are easier to estimate. - Best practices already exist, are documented and can be copied.	- Uncertainty is higher because commercial packages are not always available and the buyer needs to invest in the development of a new system or module in partnership with a vendor and/or consultant. - The benefits and ROI are harder to estimate. - Best practices do not exist and are being created by the innovative IT initiative.
Size	- Larger investments are needed ($300 million on average) to pay large teams of consultants who prepare the business, integrate the system, train the employees, etc. - Banks can finance these projects because of the lower levels of risks and because vendors like SAP can provide financial guarantees.	- Smaller investments are needed ($25 million on average) to explore and test the new system in pilot units with a few customers. - The corporation finances the project because banks are not willing to take the risk and vendors do not provide guarantees.

Table 6-1 Comparing the contextual elements of the two opposing types of IT initiatives (cont'd and end)

Network of stakeholders	- The network is smaller and the role of external stakeholders is more operational (less strategic).	- The network is typically broader and consultants are usually involved on a more strategic level and are willing to share both the risks and benefits of the project.
Competition and strategic motivations	- Aspirations to transform the business, centralize operations, replace legacy systems and reduce costs drive the IT initiatives.	- The initiatives are driven by competitive moves and by motivations to explore new markets for growth. Growth-oriented initiatives also aim at building new IT and innovation capabilities that lead to both product and market innovations.

The lower levels of uncertainty and risks in efficiency-oriented initiatives are relative and these initiatives are still highly ambitious and very hard to execute given the high levels of business transformations and process innovations and the large number of employees affected by such changes inside the business. Efficiency-oriented initiatives transform the business and include process automation, process reengineering and process innovation that lead to large cost-efficiencies and eventually to increased profitability (affecting the bottom line of the business). These initiatives typically involve more mature IT systems such as ERP and CRM platforms and are typically larger in size implying larger financial investments.

Although all the efficiency-oriented initiatives examined in this research were successful in the end, many similar initiatives fail in reality because of the considerable levels of uncertainty, risks and hard work they entail. In other words, the levels of uncertainty and risks in efficiency-oriented initiatives are high and those in growth-oriented initiatives are even higher.

In growth-oriented IT initiatives, the work is more exploratory and senior IT managers use highly entrepreneurial approaches to address the complex socio-technical dynamics and their relationships with the broad network of strategic stakeholders. Growth-oriented initiatives involve IT systems in more dynamic and evolving domains such as product development and mass customization that affect product and service innovation and present opportunities for market creation.

Growth-oriented initiatives that lead to product and market innovations (affecting the top line) are typically smaller in size. Here is a graph showing the average size of initiatives in each family of the sample:

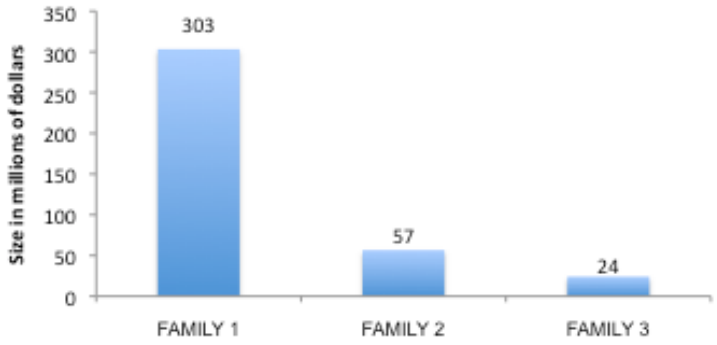

Figure 6-1 Average size of initiatives in each family

While efficiency-oriented initiatives in the study have an average size of $303 million, growth-oriented initiatives have an average size of $24 million. The graph shows how exploratory innovation in IT initiatives is almost inversely proportional to size. Investments are larger and faster when the IT platform is tested and mature, and when value creation is more measurable by calculating cost savings over short periods of time (as opposed to growing revenues over longer periods of time).

6.2 The common systemic features of governance in strategic IT initiatives

Before looking at the main variations and distinctions for each axe of governance (project, intra-organizational and inter-organizational) between efficiency-oriented and growth-oriented initiatives, the general features of the governance architecture (system) are presented.

The study suggests that governance in strategic IT initiatives is systemic and holistic. Instead of a one-dimensional view that either focuses on ongoing intra-organizational or inter-organizational relationships, strategic IT initiatives need a three-dimensional approach. The governance system comprises three complementary perspectives that managers apply simultaneously: (1) the project perspective, (2) the intra-organizational perspective, and (3) the inter-organizational perspective. While the first perspective allows managers to address the temporary and destabilizing nature of

innovative projects, the second and third perspectives allow them to address more stable and long-term decision-making relationships with internal and external stakeholders respectively.

29 governance mechanisms or themes emerged after the three analysis phases from which 11 were grouped under the project governance category, 10 under the inter-organizational governance category and 8 under the intra-organizational governance category. Inter-organizational governance themes occurred as frequently (37%) as project governance themes (38%) but intra-organizational governance themes occurred less frequently (25%). The chart below illustrates the relative importance of the three governance dimensions based on their occurrence in the sample.

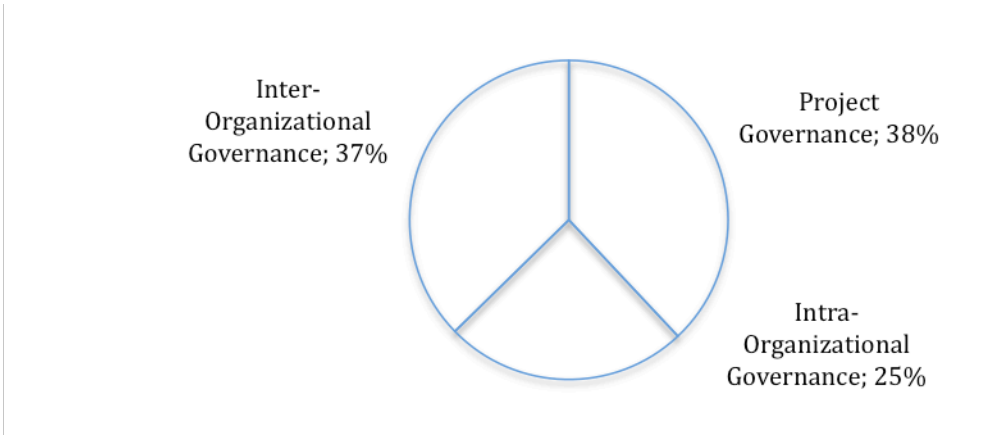

Figure 6-2 Relative importance of the three governance dimensions

The table below shows that 38% of all references to governance themes fall in Family 3 (efficiency-oriented) while only 29% fall in Family 1 (growth-oriented).

Table 6-2 Overall governance scores

Governance axes (categories)	**Family 1**	**Family 2**	**Family 3**	**TOTAL**	**%**
Project Governance	257	245	272	**774**	**38%**
Intra-Organizational Governance	163	162	176	**501**	**25%**
Inter-Organizational Governance	173	268	326	**767**	**37%**
TOTAL	**593**	**675**	**774**	**2042**	
%	**29%**	**33%**	**38%**		

6.3 The two distinct modes of governance in strategic IT initiatives

In Chapter 5, the links between the three governance dimensions (project, intra-organizational and inter-organizational) and the two types of innovation (exploratory and exploitative) were explored by examining the variation of each governance mechanism (theme) throughout the three families of strategic IT initiatives (efficiency-oriented, mixed and growth-oriented). Interestingly, important distinctions were discovered and especially between the families of efficiency-oriented initiatives and growth-oriented initiatives (the two poles in the sample). As seen in the previous chapters, two types of variations resulted from the qualitative analysis and coding process of the interviews: (1) quantitative variations or the frequency of occurrence of the themes, and (2) qualitative variations that reflect the nuances in governance themes and the various types of existing sub-themes.

The purpose of this section is thus to present the major variations observed that distinguish between efficiency-oriented initiatives and growth-oriented initiatives with an emphasis on the qualitative variations.

In the final research model (presented below), the governance architecture is divided in two types of mechanisms: (1) key mechanisms for growth (black), and (2) key mechanisms for efficiency (white). This separation is based on the occurrence of each theme in both families of IT initiatives (growth-oriented and efficiency-oriented). The results show that while 23 themes occur more frequently and intensely in growth-oriented initiatives, only 6 themes occur more frequently and intensely in efficiency-oriented initiatives.

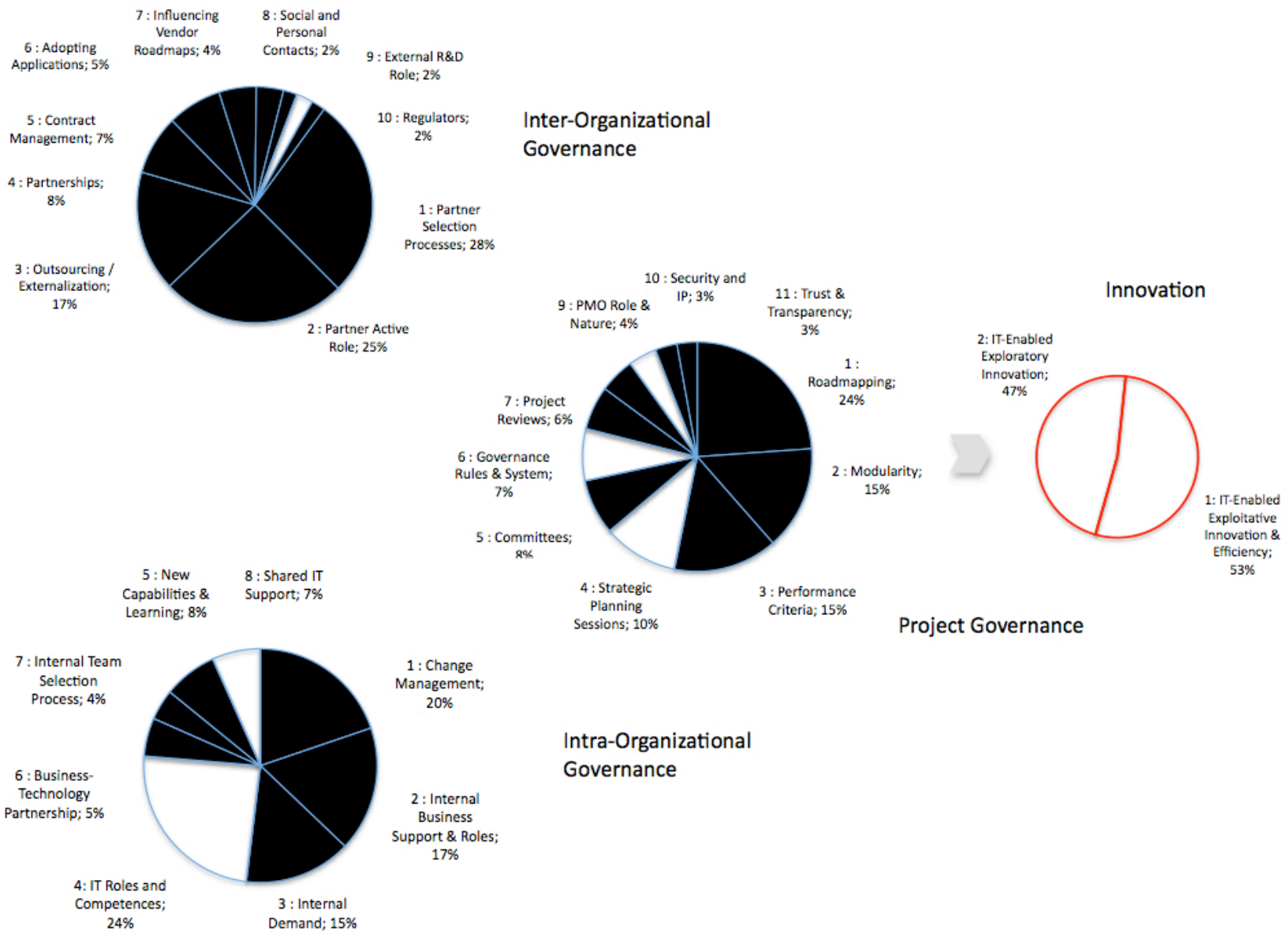

Figure 6-3 Final research model

i) Project governance distinctions

The results show variations (especially qualitative) in the way project governance mechanisms are used to address efficiency-oriented and growth-oriented initiatives. These project-based mechanisms are more temporary, project-based and generally affect all stakeholders (internal and external).

Overall quantitative variations (based on occurrences) are small in project governance but growth-oriented initiatives show higher scores on average. While the results show that eight of the eleven mechanisms are more important in growth-oriented initiatives and three in efficiency-oriented initiatives, important quantitative variations are observed in only a portion of these themes. Modularity, Committees and Project Reviews show more significant variations with higher scores in growth-oriented initiatives and Strategic Planning Sessions shows more significant variations with higher scores in efficiency-oriented initiatives. Nonetheless, the project governance distinctions that exist between both types of strategic IT initiatives are mainly due to qualitative variations and nuances described in the following table:

Table 6-3 The qualitative Project Governance distinctions in strategic IT initiatives (cont'd)

Project Governance	**Efficiency-oriented strategic IT initiatives**	**Growth-oriented strategic IT initiatives**
1. Roadmapping	- The roadmapping process is more sequential and most of the roadmap is determined at the front-end of the project. - The front-end episodes are longer. - Roadmaps are straightforward and often predetermined by tested methodologies sold by consulting firms.	- The roadmapping process is longer, more exploratory and more iterative because of the higher uncertainty, change and the need for constant research, testing and negotiation. - The roadmaps are developed in collaboration with both internal and external stakeholders. - Roadmaps change and these changes need to be constantly communicated.
2. Modularity	- Modularity is important but is often done unit by unit (as opposed to function by function) because the expected benefits are easily communicated given the experience of consultants with similar projects. - Within a business unit the deployment can be split in functional modules but deployment plans are predetermined.	- The IT initiative is decomposed in smaller chunks and deliverables because of the higher levels of uncertainty and the number of possible interferences between modules that could block the initiative. - The most beneficial modules and the least risky are delivered first to excite and motivate the business. - Modules are often tested in pilot units.

Table 6-3 The qualitative Project Governance distinctions in strategic IT initiatives (cont'd)

3. Performance Criteria	- Around 80% of the criteria are business criteria (as opposed to project criteria) but the criteria are very similar from one initiative to another. - Respondents identified more types of criteria in general.	- About 80% of the criteria are also business criteria but the overall types of criteria identified are fewer and many criteria are idiosyncratic and case-specific. - The disruptive nature of initiatives makes it hard to use measurable indicators.
4. Strategic Planning Sessions	- These sessions are longer and more important and they reflect a longer front-end planning phase that can last 2-3 years. - The creation of RFPs is long and hundreds of criteria are identified and then used in selecting solutions and suppliers. - They include budgeting and the estimation of the project's costs and delays.	- Strategic planning sessions are shorter and less frequent because long lists of criteria, technical requirements, and precise budgets and delays are not determined in advance. - Consultants are more actively involved. - The sessions are used to communicate the project's vision are roadmap.
5. Committees	- Both permanent and temporary committee structures are used and internal stakeholders (functional departments like HR and finance) are more present on the committees than external stakeholders.	- Committee structures are more emphasized in general and are used more regularly to address change and issues. - Both permanent and temporary committees are used, and external stakeholders are more present than internal stakeholders.
6. Governance Rules & System	- The more standard compliance-oriented governance concepts are emphasized more in efficiency-oriented initiatives because of the stability and maturity of ERP and CRM projects and because of the existing methodologies for managing the strategic alignment with corporate governance and for establishing strong reporting structures.	- Although the strategic management approaches used by the respondents are viewed as governance mechanisms in this study, the respondents generally associated governance to reporting and compliance structures and not necessarily to the more dynamic and creative relationships found in growth-oriented initiatives.
7. Project Reviews	- Respondents did not emphasize project reviews as much because they are easier and they entail lower levels of change and fewer divergences from the initial plan. - The attainable predetermined deadlines and closures reduce the need for reviews.	- The intensity of this mechanism is (almost double), which reflects the larger frequency of project reviews and their higher difficulty because of the degree of change and unexpected issues that need to be addressed. - The mechanism provides flexibility and an excellent way to learn and adjust.

Table 6-3 The qualitative Project Governance distinctions in strategic IT initiatives (cont'd and end)

8. Funding Process	- Projects are much larger in size ($303 M on average) but the investment less risky. - Large vendors like SAP can provide financial guarantees. - Banks are willing to help the corporation finance the project and the costs are partially or totally redistributed to the business units that benefit from the system. - The financing for the total budget has to be confirmed up-front for the project to start.	- Projects are much smaller in size ($24 M on average) but the investment is riskier. - The corporation finances the project and costs do not affect the performance of a particular business unit. - The financing is conducted gradually and in rounds as long as the delivery process and the project's track record are positive. - Suppliers are motivated to work for less because of their high stakes in the co-created innovations and commercialization.
9. PMO Role & Nature	- The typical PMO (Project Management Office) structure is found in more initiatives and more formal and normative project management techniques are used in a more traditional way.	- The PMO structures are rarely used because traditional project management approaches cannot be used. - External project managers are sometimes hired but the CIO and the IT team conduct a large part of the project management work.
10. Security & IP	- One respondent in efficiency-oriented initiatives advanced the security and IP issues because they are fully addressed at the front-end of the project. - The new knowledge captured and programmed into the system is very limited and the content is protected.	- New applications are developed using new knowledge and IP. - The new knowledge (and IP) captured and programmed is not always identified in advance and they require constant negotiations and contractual adjustments. - The domains affected are core for the business and more dynamic, which requires higher levels of security.
11. Trust & Transparency	- Trust and transparency are more critical in intra-organizational relationships between IT and all levels of employees (top management, middle management and the functional employees affected)	- Trust and transparency are more critical in inter-organizational relationships. - High-level intra-organizational relationships between IT and top management need to be based on trust and transparency.

As shown in the above table, the roadmapping process is longer and more iterative in growth-oriented initiatives and the roadmaps are developed in collaboration with internal and external partners. In efficiency-oriented initiatives on the other hand, the roadmaps are to a large extent determined at the front-end of the project and include more precise budgets, delays and criteria. Most of the other themes like Modularity and Project Reviews show important qualitative distinctions as well. For instance Modularity in growth-oriented initiatives implies the identification and implementation of highly beneficial and low-risk modules to excite the

business and keep the level of trust and the project momentum high. This quick delivery of highly beneficial modules is a critical mechanism that IT managers use to address the high level of uncertainty in their projects. Furthermore, while modules are delivered function by function in growth-oriented initiatives and often tested in pilot units, they are delivered unit by unit in efficiency-oriented initiatives.

Although the three secondary project governance themes are not presented in the above table, it is worth noting that while all three secondary themes occurred in growth-oriented initiatives, only one of them occurred in efficiency-oriented initiatives.

ii) Intra-organizational governance distinctions

The results do not show overall quantitative variations (in the occurrences) in intra-organizational governance. However, certain mechanisms show important quantitative and qualitative variations. For instance, while Change Management references occurred twice as much in growth-oriented initiatives, the theme shows more important qualitative distinctions. In growth-oriented initiatives, the process is designed to address a smaller number of higher-level managers but it is designed to address a much larger number of lower-level managers and employees in efficiency-oriented initiatives. On the other hand, Internal Demand depicts a very different process in growth-oriented initiatives because of the important role the business people play in generating the ideas and needs for the new IT applications and features. In efficiency-oriented initiatives, IT managers are contented if the internal acceptance or buy-in for the new system is attained. However, in growth-oriented initiatives the acceptance of the new system does not suffice and the business has to be capable of pulling for IT-driven innovations that the IT function would subsequently select and implement. The other important intra-organizational qualitative variations that distinguish between efficiency-oriented and growth-oriented initiatives are described in the following table:

Table 6-4 The qualitative Intra-Org. Governance distinctions in strategic IT initiatives (cont'd)

Intra-Organizational Governance	Efficiency-oriented strategic IT initiatives	Growth-oriented strategic IT initiatives
1. Change Management	- Efficiency-oriented initiatives show resistance on a lower level because of the way the new systems affect the business processes and work habits. - The mechanisms are used to address a larger number of lower-level individuals mainly inside the firm. - The resistance to centralization is a major issue addressed by this process.	- Growth-oriented initiatives show strong resistance and conflicts at higher levels because of the change of philosophies and business strategies they imply. - The mechanisms are used to address a small number of high-level individuals inside and outside the firm.
2. Internal Demand	- The creation of an internal buy-in and acceptance is crucial for the implementation of large platforms that disrupt work habits and centralize control. - While the acceptance is attained in larger ERP and CRM projects and while managers spend a lot of time communicating the vision and benefits of the new system, the excitement and demand for new IT features is lower.	- The senior IT managers who succeed in growth-oriented initiatives have excellent leadership skills that enable them to create excitement in the business and to build a strong internal vision for innovative IT platforms and solutions. - The strong internal demand is key for developing the right functionalities. - Critical selection processes (for the business demands) enable the IT function to prioritize, to be effective and efficient, and to serve the business as a whole in the best possible way.
3. Internal Business Support & Roles	- The involvement of business managers (middle management) is as critical as the involvement of top corporate management. - There is a dilemma when the business is growing and the attention of business managers is hard to get.	- The active involvement of top management is more important because of the higher levels of uncertainty and risk. Sponsors in the business take charge proactively. - To build a strong momentum, business people are recruited and detached from their functions to focus on the IT initiative.
4. IT Roles and Competences	- The fundamental and technical roles in the IT function are stressed. - The development of business knowledge in IT is a critical relational driver. - The IT roles and competences have evolved to include the management of skills, sourcing, finance, quality and project management in general.	- The fundamental and technical IT roles are not stressed as much. - On top of developing business knowledge inside IT to drive intra-organizational relations, consulting knowledge is built to create a capability to challenge consultants. - The IT team is instrumental in managing skills, finance and key partnerships with external partners.

Table 6-4 The qualitative Intra-Org. Governance distinctions in strategic IT initiatives (cont'd and end)

5. New Capabilities & Learning	- The new IT capabilities are created through learning and training processes. - Large investments are done initially to build competency centers that are used is the various phases of the project, for supporting the new system and for subsequent IT projects. - Serendipity is lower and the new IT capabilities are rarely used in processes they were not intended to support.	- The quick development of new IT capabilities is critical and many of these capabilities are not yet documented in existing IT manual and methodologies provided by consultants and vendors. - Typical competency centers are rarely used. - New capabilities are created through probe and learn processes and switch-use capabilities emerge and enable the improvement of processes and functions in a serendipitous way.
6. Business-Technology Partnership	- Efficiency-oriented initiatives are generally dominated by IT delivery approaches (as opposed to partnership approaches) because of the inertia created by the large size of the project. - Partnership approaches are encouraged by successful IT managers to appease the internal disruption caused by the new system. Hybrid profiles are developed and the relationship is formalized in advance.	- There is a stronger partnership relation between the business and IT. The partnership is often reflected by formal agreements where roles and responsibilities are well defined. - The ideas and opinions of the business people are more critical in determining what will be developed and how it will be implemented.
7. Internal Team Selection Process	- The business component of the new internal team is bigger than its IT component. In CRM and ERP projects, the business component accounts for about two-thirds of the team. - People are generally recruited from a specific function and there are fewer variables affecting the selection process. - The sponsor or senior manager in charge generally picks the key business people.	- The process is more challenging because business people are detached from their functions to work in a disruptive setting. - Highly motivated people are needed to assure the success of the initiative. - The IT component of the new internal team is bigger than its business component. - The CIO has a stronger and often implicit role in choosing the business people.
8. Shared IT Support	- More formal structures exist for providing the shared IT Support needed in the business like competency centers and shared IT services and resources. - The mature ERP and CRM platforms are packaged with manuals and instructions to build competency centers, and the IT consulting partners are highly experienced with such competency centers.	- These structures are not as mature, defined and documents in growth-oriented initiatives. Shared support is less important because fewer business people are affected. - The IT managers use their own structures to manage skills or to build the high-profile people who combine business, technical and relational competences. One CIO reused a SAP competency center for his initiative.

The variety of secondary intra-organizational themes is similar in both efficiency-oriented and growth-oriented initiatives. Rare and case-specific themes emerged in both types of initiatives.

iii) Inter-organizational governance distinctions

The variations and distinctions that exist in the way inter-organizational governance mechanisms are used in efficiency-oriented and growth-oriented initiatives are the most significant findings in this research. This governance axe is used in very distinct ways with each type of IT initiative and entails important quantitative and qualitative variations.

As previously seen in Chapter 5, while inter-organizational governance mechanisms occurred on average in 76% of the cases in growth-oriented initiatives, they only occurred in 48% of the cases in efficiency-oriented initiatives. With the exception of one theme, all the primary inter-organizational governance themes are more important in growth-oriented initiatives. Also, some mechanisms like Partner Selection Process, Partnerships, Contract Management and Influencing Vendor Roadmaps show very significant quantitative and qualitative variations. For instance, the average occurrence of Partnerships and Contract Management in growth-oriented initiatives is three times their average occurrence in efficiency-oriented initiatives. Also, Influencing Vendor Roadmaps is critical in growth-oriented initiatives and completely absent in efficiency-oriented initiatives.

Although the results show important quantitative variations in inter-organizational governance, the qualitative distinctions are more significant. The inter-organizational qualitative variations and nuances that distinguish between efficiency-oriented and growth-oriented initiatives are described in the following table:

Table 6-5 The qualitative Inter-Org. Governance distinctions in strategic IT initiatives (cont'd)

Inter-Organizational Governance	Efficiency-oriented strategic IT initiatives	Growth-oriented strategic IT initiatives
1. Partner Selection Processes	- Structured approaches are used to gather enough information before defining requirements and selecting partners. - Vendors are selected before the IT consultants. The selection of most vendors is based on an integrated approach (as opposed to a best-of breed approach). - The vendor's platform is used to ramp up the company's internal capabilities. - The vendors are selected for their ability to: (1) provide a fully integrated solution, (2) respond to a very large number of functional criteria, and (3) support the size of the buyer and to firmly commit with a large warranty fund at the front-end.	- If the company partners with an IT consultant, it ends up having little influence (if none) over the vendor selection process. - One of the key selection criteria is the partner's willingness and capability to commit early and to invest substantially in R&D before the contract is even signed. - Two approaches are used in selecting vendors: (1) the best-of-breed (BOB) approach, or (2) the integrated approach. - The vendor helps the company program its knowledge and best practices in its commercial platform and provides constant improvements in new releases.
2. Partner Active Role	- IT consulting firms are hired in all cases and have an important tactical and operational role. Their strategic role is limited in most cases. - The role of strategy-consulting firms like BCG and PWC is more limited. They only provide their packaged methodologies and frameworks. - Vendors had an active role in most cases. - Other external expert partners were almost completely absent.	- The role of IT consultants is either very important or completely absent. When IT consultants are used (in two-thirds of the initiatives), they have a very strategic and active role. - When IT consulting partners are not used, strategy-consulting firms (such as BCG and PWC) are hired to conduct studies and to help the company make decisions. - Expert partners such as research labs have an active role in the co-innovation process.
3. Outsourcing / Externalization	- Most of the project activities are conducted internally (many in the business functions) and only a portion is externalized. - Development and support activities are often outsourced to offshore locations such as India or the Philippines.	- Most of the project activities (often 80%) are externalized and conducted by consultants, external programmers and experts. Once the project is over, the ratio is reversed and internal employees conduct most of the recurrent work. - Development and support activities are also often outsourced to offshore locations.

Table 6-5 The qualitative Inter-Org. Governance distinctions in strategic IT initiatives (cont'd)

4. Partnerships	- Partnerships are strong with the vendors especially when (1) the buyer is a leader in the industry, and when (2) the market in the industry is large and still untapped. The buyer can become a reference for the vendor in the related industry and can help the vendor exploit the market.	- Partnerships with IT consultants are strong joint ventures. Both parties share the risks and benefits of the venture. - The IT consultants have proactive leadership positions given the strategic importance of the venture for them.
5. Contract Management	- Contracts are important but once prepared at the beginning and rarely changed or adjusted throughout the project. - Managers avoid discussing issues that fall outside of the boundaries of the contract. - The consulting profiles, their roles and competences, have to be specified. Incentives and penalties for budget control are other critical elements of the contract. - The boundaries of innovation and change are set in advance in the contracts to control risk. Contracts typically allow 5% change to adjust or integrate new ideas.	- The management of contracts (and in turn formalism) is more emphasized in growth-oriented initiatives. - The management and the quality of contracts are critical elements of the co-innovation relationship. - Consulting profiles are also specified in the contract but the incentives and penalties to control budgets are less critical. - Explicit short-term contracts (for fast and effective delivery) are combined with implicit long-term agreements.
6. Adopting Applications	- A variety of commercial solutions exist in most industries that companies can adopt so they do not need to build their own proprietary ERP or CRM system.	- Although some buyers have chosen to develop their own homemade applications, there is a tendency to adopt the commercial solution and to work in collaboration with a specialized vendor.
7. Influencing Vendor Roadmaps	- Instead of customizing the platform to completely match it to the existing processes, the buyers work in collaboration with the vendors and convince them to improving certain modules by adapting the commercial package. The adaptations and the buyer's ability to influence the vendor's roadmap are limited given the complexity of such integrated systems.	- When the company adopts a commercial solution, instead of customizing it and matching it to its processes, it works closely with the vendor and consultants to adapt the solution to its specific needs. The high level of adaptation is driven by the company's ability to influence the vendor's roadmap. This process exists when the potential to commercialize and scale the new solution is high enough.
8. Social and Personal Contacts	- Personal contacts and relationships are often seen as threats (instead of strengths) in efficiency-oriented initiatives. They are generally associated to opportunism and opposed to trust and cooperation.	- The strong personal contacts are critical in overcoming the uncertainties and inherent instabilities in growth-oriented initiatives. IT managers and CIOs have developed relationships with key consultants over the years that they trust.

Table 6-6 The qualitative Inter-Org. Governance distinctions in strategic IT initiatives (cont'd and end)

9. Regulations	- Regulations can influence the initiatives and vary according to the industry. - Regulators bodies are often involved given the large size of the projects.	- Regulations can also influence growth-oriented initiatives. If the industry is highly regulated, the regulatory requirements can slow down the innovation process.
10. External R&D Role	- The role of external R&D is completely absent in efficiency-oriented initiatives.	- External R&D can lead to substantial improvements in the new platform. R&D is provided by specialized organizations such as research labs.

The above table shows that inter-organizational governance mechanisms are used in two very distinct ways. For instance the Partner Selection Processes theme reflects two very distinct ways of selecting partners using different criteria. In efficiency-oriented initiatives, IT consultants are always used and vendors are generally selected before the IT consultants. In growth-oriented initiatives on the other hand, IT consultants are not always used but if used they are brought in early and become highly involved in the selection of the vendors. The Partnerships theme also shows that different types of partnerships are built. Although partnerships exist in efficiency-oriented initiatives, they are less frequent and strategic with IT consultants and more frequent and strategic with vendors. However, in growth-oriented initiatives, partnerships are much stronger with IT consultants and often become joint ventures where both parties share the risks and benefits of the venture.

Interestingly, eight secondary and rare inter-organizational governance mechanisms emerged and while all of them occurred in growth-oriented initiatives, only one of them occurred in efficiency-oriented initiatives. This is a very good indication of the larger variety of mechanisms and the higher complexity in the inter-organizational governance architecture used in growth-oriented initiatives as opposed to efficiency-oriented initiatives.

6.4 Governance is enhanced, open and collaborative in growth-oriented IT initiatives

Although the main research results lie in the qualitative distinctions that exist between the governance systems used to address change and innovation in each type of strategic IT initiatives (presented in the previous pages), the occurrences of themes (or the emphasis on the various governance themes by the respondents) show interesting tendencies in each family of IT

initiatives. The overall occurrences of governance themes (presented in the graph below) show that managers in more exploratory initiatives (Family 3) put more emphasis on governance themes and especially on inter-organizational governance themes.

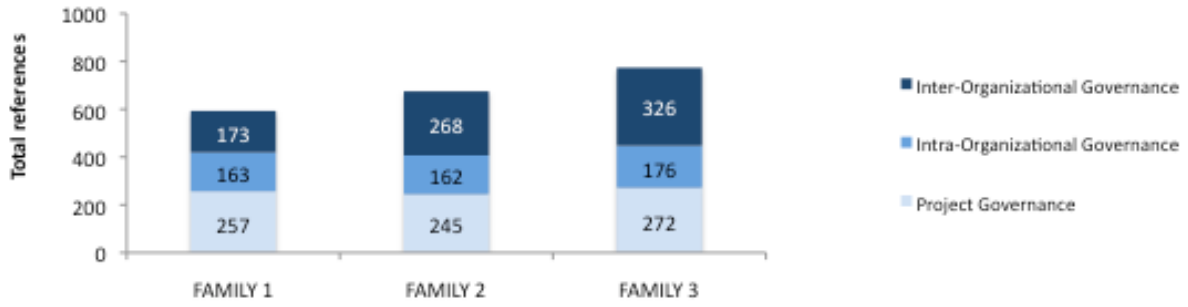

Figure 6-4 Overall references to governance themes throughout the families of initiatives

The results depicted in the above graph suggest that governance is more intense and more diverse when innovation is more exploratory. Growth-oriented strategic aspirations culminate in more complex IT initiatives that require higher levels of governance.

Governance mechanisms counterbalance the fluid nature of highly innovative IT initiatives where a large number of internal and external stakeholders interact under the leadership of the sponsor to co-develop and integrate new IT systems. Because the specifications of such new systems are defined and discovered throughout the project, normative techniques in planning, project management and IT management can lead to failure if used alone.

In the final research model (presented later), about three quarters of the governance mechanisms are more important in growth-oriented initiatives (only one quarter are more important in efficiency-oriented initiatives). In sum, the findings suggest that the governance of strategic IT initiatives is more critical if the intention is to create value through innovation as opposed to efficiency. Furthermore, growth-oriented initiatives generally imply larger, more dynamic and more complex networks of external stakeholders, which need to be coordinated by higher levels of governance.

The research results also suggest that innovation in growth-oriented initiatives is open and collaborative in two different ways: (1) inter-organizational governance is more important for innovation, and (2) firms use collaborative strategies as opposed to competitive strategies.

i) Inter-organizational governance is more important for innovation

The results and numerous distinctions presented in the previous sections suggest that inter-organizational governance is more important for innovation in the following two ways: (1) inter-organizational governance is more intense and diverse in growth-oriented initiatives as opposed to efficiency-oriented initiatives, and (2) inter-organizational governance is more intense and diverse than intra-organizational governance in growth-oriented IT initiatives.

Although governance is systemic and three-dimensional, senior IT managers in growth-oriented initiatives tend to emphasize inter-organizational governance over intra-organizational governance. The final research model includes ten primary inter-organizational mechanisms as opposed to only six primary intra-organizational mechanisms. These results highlight the open and collaborative nature of innovative IT initiatives where key inter-organizational and project mechanisms are stressed. The current study suggests that inter-organizational governance mechanisms are more important than intra-organizational governance mechanisms for value creation in growth-oriented initiatives and equally important in efficiency-oriented initiatives. Firms can no longer use IT initiatives by building on internal capabilities without also using extensive collaboration with external IT partners (consultants, vendors, etc.).

ii) Collaboration as opposed to competition

Our results show that senior IT managers in growth-oriented initiatives use highly collaborative strategies that draw upon the principles of open innovation (Chesbrough, 2003). Partnerships are key drivers of the innovation process leading to both IT-enabled product innovation and IT-enabled market creation.

CHAPTER 7: DISCUSSION & CONCLUSIONS

In this chapter, the theoretical, methodological and managerial implications will be discussed. The limitations of the research as well as the recommendations for further research will be presented.

7.1 Theoretical implications

The theoretical contributions and implications of the major research results as well as the theoretical implications of each governance mechanisms of the final research model are presented here.

The common systemic features of governance in strategic IT initiatives

The results suggesting a systemic view of governance including three different dimensions contribute to the literature in four different ways described below.

i) First, in comparison to the existing research in IT governance where post-implementation governance is examined and where intra-organizational governance mechanisms and processes are studied, our current research investigated the front-end of IT governance. This is where transformational and innovative projects arrangements are created to build and integrate new systems and capabilities, where the levels of change and uncertainty are higher and where inter-organizational and project governance are critical. Instead of looking at how to govern and organize existing IT systems, the research studied how firms govern and organize the projects that lead to the implementation of new IT systems oriented towards innovation. This major distinction looks at the two additional dimensions that emerged in the final research model (project and inter-organizational) to complement the intra-organizational dimensions emphasized in the IT literature. In other words, IT governance currently focuses on the exploitation side of strategy as opposed to its exploration side. This research contributed to theory by studying the widely unexploited exploration and front-end side of IT governance.

ii) Second, the results have important implications for the IT alignment and governance literature that focuses on intra-organizational governance and efficiency. The IT strategic alignment frameworks are focused on the way IT can be used to change organizational routines and enhance efficiency as opposed to innovation (Venkatraman, 1994, 1997; Henderson & Venkatraman, 1999; Feld and Stoddard, 2004; Ross et al., 2006). These frameworks draw upon the RBV approach and largely focus on intra-organizational logics and internal capabilities of firms. Also, the SAM (Strategic Alignment Model) model (Henderson & Venkatraman, 1999) recognizes the need for systemic competencies and IT governance but it does not provide a practical framework (De Haes & Van Grembergen, 2004), and it focuses on ongoing efficiency-oriented relationships as opposed to project-based co-innovation relationships. The IT governance literature is different in that it provides more practical frameworks than the IT strategic alignment literature but it is still excessively concerned with the internal alignment of IT and business strategy and intra-organizational governance (Weill & Ross, 2004; De Haes & Van Grembergen, 2004; Nolan & McFarlan, 2005). By contrast, the current research extended the existing IT governance frameworks to study IT initiatives by applying the concepts of (1) project governance, (2) inter-organizational governance, and (3) open innovation.

iii) Third, the current research focused on the inter-organizational relationships in project settings where several partners are involved simultaneously and where relationships are created and redefined. In contrast, the existing two perspectives in the literature that examine the strategic implications of IT outsourcing are limited to ongoing and stable relationships. Compared to the results of the current research: (1) the first concludes that only non-strategic IT activities are to be outsourced (Stewart et al., 2002; Prahalad & Krishnan, 2002), and (2) the second shows that relational governance can lead to value creation through knowledge sharing, flexibility and the use of appropriate types of SLAs (Weeks & Feeny, 2008; Goo et al., 2009; Gopal & Koka, 2012). Other authors who looked at the link between supply-chain relationships and competitive advantage studied the concept of relational governance (Dyer, 1996; Dyer & Singh, 1998; Wang & Wei, 2007). Although these authors address the complementary capabilities that lead to more effective relationships in supply-chains, their studies draw upon the concepts of transaction-cost economics (Williamson, 1985). They emphasize cost reduction, cost control, and efficiency as opposed to innovation, growth and market creation. In these studies, the concept of value

creation that leads to competitive advantage is largely focused on the efficiency and economic rent obtained from the ongoing and stable client-supplier relationships in supply-chain and IT-outsourcing processes (through flexibility and complementary capabilities). In contrast, the findings show how new and vibrant inter-organizational relationships in IT project settings can be leveraged by the firm to create value through open co-innovation (Brandenburger & Nalebuff, 1996; Chesbrough, 2003).

iv) Fourth, the results of this research are also relevant for the field of project management because of the way the final model suggests mechanisms to connect the temporary and one-off project relationships and activities to the more stable and long-term intra-organizational and inter-organizational relationships. This systemic approach is needed in a field overcrowded with normative techniques. Moreover, the findings respond to the needs in the field to reconnect project management to business process, organizational logic and business strategy (Morris, 1997; Williams, 2005; Cicmil & Hodgson, 2006; Bresnen, 2006; Clegg et al., 2006).

The current research extends project governance views in two different ways: (1) it adds a critical inter-organizational dimension to the intra-organizational view of project governance (Turner, 2006; Weaver, 2007), and (2) it adds a critical intra-organizational dimension to the inter-organizational view of project governance (Miller & Lessard, 2001, 2010). While some project governance mechanisms found in large engineering projects look similar to the ones found in this research, many distinctions are also to be noted. For instance, modularity is expanded in IT initiatives because of the nature of software that provides a broader range of opportunities for modularity than power plants or other physical constructions.

In the systemic view of IT governance for innovation proposed in this research, the three dimensions (axes) of governance combined 23 key mechanisms (themes) for innovation and 6 key mechanisms for efficiency. Governance mechanisms are concepts that managers use to develop the structures by which they hope to gain some control on the evolution of their initiatives (Miller and Lessard, 2001). These governance mechanisms are defined in the literature

as decision-making structures, alignment processes, communications (Weill & Ross, 2004), and relational mechanisms (De Haes & Van Grembergen, 2004). The mechanisms found in our research are either structures, processes, communications, relational mechanisms or combinations of these four mechanisms. The theoretical implications of all the governance mechanisms discovered in this research will be presented in the next pages.

The two distinct modes of governance in strategic IT initiatives

A two-dimensional typology of strategic IT initiatives has emerged with two distinct modes of governance. The research results show that each type of innovation (exploratory and exploitative) is related to a very distinct type of governance system or architecture. In other words, the results showed very rich distinctions in efficiency-oriented and growth-oriented initiatives that create a two-dimensional typology of strategic IT initiatives. This governance-based typology for innovating has not been previously used in the context of strategic IT initiatives.

i) In the IT-Enabled Innovation literature, authors suggest three types of innovations to study the ongoing IT outsourcing relationships (Weeks and Feeny, 2008) and the internal management of IT applications (Prahalad & Krishnan, 2002; Marwaha & Willmott, 2006): (1) operational IT innovations, (2) business process innovations, and (3) strategic innovations. Instead of comparing operational and strategic IT as most of the literature does, the current research focused on a comparison between efficiency-oriented and growth-oriented initiatives.

ii) In the IT Governance literature, authors generally organize IT activities in the firm in two categories: (1) activities that support strategy and aim at cost reduction, and (2) activities that influence strategy and create value through efficiency. Raymond et al. (2002) distinguished between (1) the dependence approach, and (2) the impact approach, Nolan and McFarlan (2005) between (1) defensive governance, and (2) offensive governance, and Venkatraman (1997) between (1) evolutionary IT, and (2) revolutionary IT. Instead of looking at both the activities that support strategy and those that drive strategy, this research has focused on the activities that

drive strategy and create value. Moreover, within these activities that drive strategy, the research makes a distinction between activities that aim for efficiency and those that aim for innovation.

iii) Finally, in the Project Governance literature, we have not seen any study that addresses both the intra-organizational and inter-organizational perspectives in IT initiatives. The Project Governance literature is usually not sensitive to the idiosyncrasies of strategic IT initiatives where the distinction between growth and efficiency logics is critical.

Governance is enhanced, open and collaborative in growth-oriented IT initiatives

In the literature, governance and innovation are almost never investigated together because the concepts are regarded as being contradictory. This is strongly felt in the IT governance literature. IT governance is generally linked to compliance and seen as a way to link IT to finance instead of the other business functions that drive R&D, marketing and production. Additionally, the value creation component of IT governance is associated with efficiency as opposed to innovation. By contrast, the results of this research suggest that governance and innovation are mutually reinforcing. The results suggest that governance is more important and more elaborate in the IT initiatives oriented towards innovation (as opposed to efficiency).

Furthermore, the IT Governance literature emphasizes intra-organizational relationships and mechanisms and largely ignores project-based as well as inter-organizational mechanisms. For instance, authors (Weill & Ross, 2004) suggest that IT Governance is powerful in that it enables executives to instill desirable IT-related behaviors through several business functions or units (or throughout the entire enterprise) even if the firm has a decentralized organizational structure. In contrast, the present research suggests that IT governance could be even more powerful in addressing the uncertain and temporary structure of IT initiatives if it includes two additional sets of mechanisms: (1) project governance mechanisms, and (2) inter-organizational mechanisms.

The research results suggest that: (1) to innovate, IT managers focus on collaboration (with external partners) as opposed to competition, and in consequence (2) inter-organizational governance is more important than intra-organizational governance for innovation. In the IT alignment and governance literature, Henderson and Venkatraman (1993, 1999) attempted to extend the strategic alignment of IT in their SAM model by applying Porter's competitive strategy (Porter, 1980) that looks at the position of the IT organization in the IT marketplace. In contrast, the research extends the strategic alignment of IT by applying the concepts of open and collaborative innovation (Brandenburger & Nalebuff, 1996; Chesbrough, 2003). Instead of looking at how competitive strategies and the positioning in the IT marketplace can lead to value creation through operational efficiency, the research results show that collaboration and strategic partnerships can lead to value creation through co-innovation.

Finally, the results clearly show that the extant IT Governance literature lacks the inter-organizational dimensions that are needed in growth-oriented initiatives. The literature is largely focused on intra-organizational mechanisms that managers use to create value through efficiency and exploitation. In other words, the IT Governance literature needs to be extended to include inter-organizational mechanisms and drivers for creating value through innovation and exploration.

7.2 Methodological implications

In addition to the theoretical contribution, this study also makes a methodological contribution. In the IT management literature, most studies are conducted on the exploitation of IT (as opposed to exploration) and on processes characterized by lower levels of uncertainty, innovation, and social interactions. In turn, most methodologies used are quantitative and theory-testing methodologies where hypotheses are tested through statistical sampling techniques.

Instead, in this research, a theory-building qualitative approach was adopted to study highly dynamic, uncertain and social situations; high-level decision-making processes and governance mechanisms are explored. Quantitative theory-testing approaches are hard to apply in this research.

The methodology adopted draws upon the GT approach (Glaser & Strauss, 1967; Corbin and Strauss, 1990; Paillé, 1994; Laperrière, 1997) including two complementary analysis techniques: the typological approach (Desgagné, 2005), and the qualitative content analysis approach (Robert and Bouillaguet, 2002; Suddaby, 2006). The combination of these two complementary GT-driven techniques allowed for the understanding of the highly dynamic and complex context of strategic IT initiatives. The GT approaches emerged in the field of social sciences and are still rarely found in management research and especially IT or IS research.

Finally, the heart of the theory-building method used is the conceptual saturation process whereby our research model evolved in its structure and components, and through which hypotheses and the final results were crafted. Moreover, the theoretical sampling process ended once conceptual saturation was attained. In contrast, statistical sampling processes for quantitative research only work if a minimum number of cases are used to test pre-determined hypotheses. This said, the pertinence of the selected cases and interviews is more important than their number in qualitative theory-building approaches once conceptual saturation is achieved.

7.3 Managerial implications

This study ranks amongst the many ones that end-up challenging the rational view of management. Managers, we have observed, govern by using multiple mechanisms (project, intra-organizational, and inter-organizational), as they know the limits of predictions and forecasts. The findings suggest that managers who undertake highly exploratory IT initiatives that aspire to achieve innovation and growth constantly search for governance mechanisms that provide flexibility and build the capabilities to address the prevailing complexity and the many open-ended relationships.

The governance model developed in this research is a tool for IT managers seeking to create value through their strategic IT initiatives. The governance model provides a practical management framework enabling the coordination of broad, complex and uncertain co-innovation relationships in the context of IT. The results show that two different logics of

innovation exist in strategic IT initiatives that require two different types of governance: (1) a process innovation logic that aims for business efficiency and increased profitability, and (2) a product/market innovation logic that leads to growth.

The innovation process is broader and not only a question of closed or open R&D. Instead, the IT organization is central in supporting and driving the innovation process in business. The IT organization is the metabolism of information and knowledge (Chesbrough, 2003; Hopkins, 2010) in the way it supports and drives the innovation capability of the firm, and the heart of growth and market creation in the way it enables the co-development of IT breakthroughs. In view of that, the role of the CIO has to expand from the management of information to the management of innovation, from financial reporting to strategic decision-making, and from exploitation (and execution) to exploration.

The governance model is beneficial for IT managers because it highlights the systemic and holistic nature of strategic IT initiatives. In fact, the model expands the normative and industrial standards (e.g. COBIT and ValIT) that focus on efficiency and on the exploitative intra-organizational dynamics within the firm. Instead, our governance model suggests an approach to manage the exploratory and multi-dimensional dynamics in project settings (project, intra-organizational and inter-organizational) that drive innovation, market creation and growth. While these normative techniques aim at both compliance and value creation, the latter is largely focused on efficiency and needs to be expanded to include innovation. In COBIT for instance (ITGI, 2008a) the links between innovation goals and IT governance are weak in that the mechanisms suggested to manage change and to create flexibility are largely focused on HR management techniques and normative project management techniques. The table below compares the results of our research with the two major governance frameworks (COBIT and ValIT) of the ITGI (2008a):

Table 7-1 Comparing the final model to major IT governance frameworks

Model	Governance focus	Process focus	Portfolio, project focus
Governance of innovative IT initiatives (Our approach)	Enterprise governance of IT initiatives for innovation (Open innovation focus)	- Enabling the innovation process (product innovations and systems breakthroughs) - Collaborating and leveraging inter-organizational relationships for co-innovation	- Govern the IT initiative (project) that aims for innovation and growth as opposed to efficiency - Provide an approach for the front-end strategic management of IT initiatives where value creation is a function of open and collaborative innovation. - Connect the temporary IT initiative to the ongoing intra- and inter-organizational processes through systemic governance.
ValIT	Enterprise governance of IT (Portfolio management focus)	- Program design and initiation - Benefit realization - Investment and ongoing value management aspects of all processes	- Manage the investment portfolio - Provide the overall view of portfolio performance - Complement the COBIT framework that focuses on the ongoing (non-project related) processes and mechanisms.
COBIT	IT governance (Focused on compliance, cost control and efficiency)	- IT solution delivery - IT operational implementation - IT service delivery	- Manage the IT project portfolio in support of investment programs - Manage the ongoing and stable governance processes that lead to compliance, cost control and efficiency. - Manage the IT service, asset and other resource portfolios - Provide information on the performance of the IT service, asset and other resource portfolios

The findings also suggest that value creation in growth-oriented initiatives is increasingly dependent on the manager's ability to instill a desirable behavior and to align the actions of a large network of external partners through an adapted set of governance mechanisms. In such innovative and exploratory situations, managers need to work harder on the inter-organizational governance of their initiatives than its intra-organizational governance.

Also, the research has implications for project managers who seek to undertake innovative and risky projects and who understand the limits of the normative project management techniques they normally use. Instead of using forecasting and rational planning techniques or managing

projects as a temporary and isolated event, project managers need to (1) prepare the future by using project governance mechanisms that allow for flexibility and adaptation, and to (2) connect their projects to long-term organizational logics through both intra-organizational and inter-organizational mechanisms.

In sum, the world of business has become uncertain, open-ended and full of emerging opportunities and risks. Managers who seek to explore new opportunities and to use IT for value creation and innovation face big challenges in forecasting, making predictions or managing the uncertainty and complexity of their initiatives. Rational project management and strategic planning techniques are no longer appropriate in these situations. Henry Mintzberg sums it all by saying that we are at the "end of strategic planning". The current research suggests that under such circumstances successful IT managers adopt a governance approach to address uncertainty and prepare for the future. While the governance model observed in this study provides a powerful tool for managing strategic IT initiatives, it does not compensate for a lack of leadership. The entrepreneurial abilities of managers will always remain at the forefront of highly exploratory strategic processes.

7.4 Limitations and further research

This study is subject to some limitations that are due to two major factors: (1) the nature of the theory-building qualitative methodology adopted, and (2) resource constrains.

This research is neither an experimental survey that aims at detecting causal relations nor a longitudinal study that involves repeated observations of the same variables over long periods of time. Instead, the research focused on developing new hypotheses through a long GT process leading to conceptual saturation.

Paradoxically, the strength of the qualitative theory-building approach from the social science perspective is often regarded as a weakness from the experimental perspective. The qualitative analysis process (the coding process) was conducted on 18 different cases. Nonetheless, the cases were sampled from a wider range of cases researched in the exploratory episode and were

selected because of their pertinence, focus and comparability. The sampling process was thus rigorous and constructive but not random. Also, the interviews were not the only data gathered for the cases. In fact, a wide range of data and documentation was gathered for each case (white papers, project plans and presentations, press releases, etc.) and in some cases several interviews were conducted for further clarification.

Yet, the qualitative approach that was adopted is limited in that no hypotheses are tested (quantitatively). Additionally, only one major interview was conducted for each case and respondents were generally not interviewed more than once. Instead of vertically studying a small number of cases (3-4 cases) like in case study methodologies and conducting several interviews with the same respondents, the current research adopted a horizontal GT process where highly pertinent respondents (senior IT managers and CIOs) were interviewed once to cover a larger number of cases (18 cases). As a result, the findings cannot be generalized. The sample used (18 strategic IT initiatives) is also not representative of all IT initiatives around the world (in all industries and with all types of platforms and applications). The model should thus be used with precaution and perhaps adapted to the specific circumstances of the IT organizations and projects.

Furthermore, the final model was limited to the two poles of governance in efficiency-oriented (Family 1) and growth-oriented (Family 3) IT initiatives. Mixed initiatives (Family 2) were removed because their common features were hard to portray and they did not provide clear distinctions in comparison to efficiency-oriented and growth-oriented initiatives. In fact, the sample was not large enough to enable the exploration of the various sub-types of mixed IT initiatives and their distinct features.

The limited available resources (time, human and financial) impacted the scope of the research questions, the selection of the sample, and in turn the outcome of the research. The research of a topic such as strategic initiatives involving interactions and interviews with high-level management in multinational companies is a challenge for doctoral students.

The findings in this research that explore the link between governance and innovation in strategic IT initiatives are an obvious starting point for future empirical and qualitative tests. Further research can also expand the typology of innovative IT initiatives by focusing for instance on growth-oriented IT initiatives and investigating cases in specific industries and sectors where IT-enabled innovation and open innovation dynamics are important. The typology can also be expanded by exploring the various types of mixed IT initiatives with various levels of efficiency-oriented and growth-oriented innovations. Investigating a specific industry or sector where more similar IT systems are used can lead to finding other distinctions in the IT-enabled innovation process. Moreover, future studies can focus on one of the three governance axes presented in the final model and investigate the related mechanisms in more depth and possibly in a more confined context.

Our results can also be used to develop an extension to existing industry frameworks like COBIT and ValIT. Further research could add innovation as a possible outcome of the governance framework and extend the value creation focus. It could also provide guidelines for the governance of front-end exploratory IT initiatives. .

Finally, the governance approach used in this research can also be applied and tested in situations outside of the realm of IT where levels of uncertainty and change are high and where social and technological forces are at stake.

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APPENDIX A: THE MODEL OF MARWAHA & WILLMOTT (2006)

Focus	- Business integration and centralization of enterprise systems has created a larger gap between technology and the business. This made collaborative problem solving and IT-enabled innovation more difficult. - To allow for IT-enabled business innovation, companies must abandon a one-size-fits-all mindset for governance and should start using a differentiated IT governance system.
Key findings	- The authors propose a model where 3 IT groups governed by different rules and metrics complement each other: 1. Managed for scale: integrate standard business processes, reduce costs, increase efficiency, balance ease of use with compliance, etc. 2. Rapid development for competitive advantage: develop new IT products rapidly for business units, products that confer an advantage in the marketplace, etc. 3. IT-enabled business innovation: recognize that IT investments can have a rule-changing and disruptive effect, explore new innovations outside of business units, etc. - The governance system (leadership, decision-making rules, skills, incentives) enables the constant integration of new IT capabilities to avoid falling in the commodity trap. - When a capability becomes a commodity it is transferred from one group to another. - While firms build IT capabilities for (1) staying-in the-race, and (2) wining-the-race, they have more difficulty building innovation capabilities. The authors saw 4 models for innovation: 1. The Venture Capital Model: investing in and acquiring third parties who innovate for the firms. 2. Innovation Networks: tapping external networks (academia, start-ups, strategic partners, etc.) for new ideas. 3. Innovation Factory: a separate business unit is created with a start-up atmosphere. 4. Skunk Works: setting up small development units to test new solutions in small markets before offering them to the whole firm.

APPENDIX B: THE MODEL OF WEEKS & FEENY (2008)

	Enabler	Description
Client Enablers	Technology knowledge	- The importance of having a common base of prior related knowledge, the bridging knowledge necessary for the transfer of ideas. - The absorption capacity concept or the readiness concept. - The balance of technical and business knowledge in the IT function.
	Selective sourcing mindset	- The selective sourcing mindset recognizes that IT is a portfolio of activities and a firm should not have a homogenous structure that constrains all aspects of its IT outsourcing relationship. - Give business units the freedom to negotiate the IT deal they want. - Use of multiple suppliers to access a wider set of ideas and promote innovation.
	A match between client IT and corporate structure	- The importance of the business knowledge of IT staff and their loyalty to business agendas. - Building a federal model where both centralization and flexibility are possible.
	Executive-level IT leadership	- The closeness of the IT leader to the CEO and corporate strategy. - The importance of the CIO role in the business team. - This ensures an informed and supportive review capability for innovation proposals.
Supplier Enablers	Business process design knowledge	- The prior related knowledge or the mirror image of the client-side requirement for retention of technical knowledge. - The ability to contribute to discussions and action plans targeted at the improvement of clients.
	Client-industry scope of the supplier	- The depth of the supplier's industry knowledge is a key innovation factor. - Exposure to clients to a wider variety of industries (not only the client industry) increases the chances of delivering radical ideas that could be very beneficial. - Industry depth versus industry breadth.
Relationship Enablers	High levels of trust	- Personal trust: refers to the confidence one has that another person will work for the good of the relationship based on their integrity and adherence to moral norms. - Competence-based trust: when one party has confidence that the other will successfully deliver their allocated tasks and responsibilities. - Motivational trust: when both parties believe the rewards and punishments they experience are geared towards achievement of joint win/win goals. Mechanisms used: bonus structures, risk sharing.
	High levels of measurement specificity	- The level of detail at which activity is monitored, as typically prescribed in the contract. - The level of effort in specifying what you want. - Contract detail. (Importance of contracts) - Trust versus specificity: conventional wisdom suggests that a relationship of trust does not require high levels of measurement specificity. - Positive outcomes of measurement specificity: (1) a detailed attention to service levels gave the suppliers a clear idea of where to target innovation efforts, and (2) the ability to monitor the costs and benefits of innovations more effectively. - The 'trust but verify' approach
	Effective innovation governance	- Three levels of governance: (1) what ideas to select, (2) what processes to use to manage implementation, and (3) how each party should be rewarded for success. - Effective governance builds confidence. - Governance arrangements should be aligned with related processes of the client firm. - Convincing arrangements: (1) innovation boards populated with client and supplier executives that meet regularly, (2) for selecting new initiatives, the boards look at the financial benefits of the initiative, the financial capacity for pursuing the initiative and the management capacity for implementation. - Ensure that implementations are subject to formal project disciplines. - Progress reviews where performance is measured and initiatives can be abandoned. - Benefit sharing mechanisms: suppliers are motivated to deliver innovations for additional revenues.

APPENDIX C: INDUSTRY SURVEYS ON IT-ENABLED INNOVATION

	CIGREF and McKinsey & Company, 2008	Capgemini Consulting, 2008
Objectives	- Understanding the IT-enabled value creation dynamics. - How can we measure the contribution of IT to the overall performance of the firm? - Understanding the key collaboration mechanisms that enable IT managers and business managers to work together effectively.	- What is the role of IT in business innovation? Does IT support or drive business innovation? - What is the gap between the potential role of IT in driving the firm's innovation and the actual position of the CIO in the strategic decision-making process?
Key findings	- Performance is co-created by the IT function, corporate strategy, and business units. - Best IT practices were identified: 1. Master IT fundamentals: master projects, costs, outsourcing, delays, etc. 2. Alliance and new IT roles: build alliances with business functions and new competences to actively support transversal and innovative business projects. 3. Integrated governance: integrate IT governance in corporate governance and enhance the role of IT in shaping business strategy. 4. IT value for the business: understand business issues and priorities, measure the IT value created, actively make IT-enabled business proposals	- 60% of surveyed CIOs believe that the IT function can simultaneously provide operational excellence and contribute to business innovation. - 72% think that externalization had a positive impact on innovation since more resources are available now for innovation. - Top innovators share the following characteristics: (1) Senior managers understand IT, (2) Effective relationships between IT and the rest of the company, (3) Excellent outsourcing services, (4) The CIO reports to the CEO or other senior managers rather than the CFO, (5) 88% of IT functions define themselves as 'partners' instead of 'suppliers'. - For IT to play a key role in innovation, the following conditions should exist: (1) effective IT leadership, (2) an open and informal organizational culture, and (3) qualitative performance determinants for IT.
Limits	- IT projects are seen as IT fundamentals and not sources for innovation and value creation. - Only internal governance and collaboration mechanisms are addressed.	- Only quality outsourcing services are mentioned. External networks for open innovation are not mentioned. - The impact of innovative IT initiatives where a network of external players contributes is not mentioned.
Relevance	- The major points here are that (1) IT governance should be integrated in corporate governance, and that (2) the CIO should actively be involved in the strategic decision-making process.	- Three points are relevant for this research: (1) the importance of internal collaboration with other functions, (2) considering the CIO a partner instead of a supplier, (3) the support from senior management

APPENDIX D: COMPARISON OF 4 RBV MODELS

	Barney & Clark	**Teece et al.**	**Saloner et al.**	**St-Amant & Re.**
General focus	Inimitable and productive resources	Dynamic capabilities and path dependencies	Organizational design for coordination and incentives	Developing capabilities through learning
Main components	Productive resources (rare, valuable and inimitable) and org. Processes	Positional assets, path dependencies and processes	ARC: Architecture, routines and culture	Resources, competences and knowledge
Fundamental values – cause	Trust (counter Williamson)	Cooperation and value creation (counter Williamson)	Vision, culture, trust and cooperation (counter Williamson)	Learning and rationality
Special focus and strength	Inimitability and managerial IT skills	Path dependencies and positional assets	Coordination through routines and interfaces, incentives and with architectures and compensation structures	Learning, capability maturity and knowledge codification
Unit of analysis	Processes	Processes	Routines	Processes
Defined sustained capabilities	(1) Org. culture, (2) trust, (3) HR management, and (4) IT management skill	Capability renewal: (1) strategic assets management, (2) competence integration, etc.	(1) Org. routines, (2) authority structures, (3) formal and informal rules	Capability development: (1) Knowledge management, and (2) problem solving
Social, culture and political dimensions	Very important	Somewhat important	Very important	Somewhat important
Managing uncertainty and complexity	Average	Average	Average	Average
Empirical research	Low	Average	Average	Low

APPENDIX E: GOVERNANCE MECHANISMS IN COBIT AND VALIT

COBIT Domain 1: Plan and Organize (10 processes, 74 controls)	
Process	**Associated control mechanisms**
PO1 Define a Strategic IT Plan	PO1.1 IT Value Management PO1.2 Business-IT Alignment PO1.3 Assessment of Current Capability and Performance PO1.4 IT Strategic Plan PO1.5 IT Tactical Plans PO1.6 IT Portfolio Management
PO2 Define the Information Architecture	PO2.1 Enterprise Information Architecture Model PO2.2 Enterprise Data Dictionary and Data Syntax Rules PO2.3 Data Classification Scheme PO2.4 Integrity Management
PO3 Determine Technological Direction	PO3.1 Technological Direction Planning PO3.2 Technology Infrastructure Plan PO3.3 Monitor Future Trends and Regulations PO3.4 Technology Standards PO3.5 IT Architecture Board
PO4 Define the IT Processes, Organization and Relationships	PO4.1 IT Process Framework PO4.2 IT Strategy Committee PO4.3 IT Steering Committee PO4.4 Organizational Placement of the IT Function PO4.5-15 IT Organizational Structure, Establishment of Roles and Responsibilities, Responsibility for IT Quality Assurance, Responsibility for Risk, Security and Compliance, Data and System Ownership, Supervision, Segregation of Duties, IT Staffing, Key IT Personnel, Contracted Staff Policies and Procedures, Relationships
PO5 Manage the IT Investment	PO5.1 Financial Management Framework PO5.2 Prioritization Within IT Budget PO5.3 IT Budgeting PO5.4 Cost Management PO5.5 Benefit Management
PO6 Communicate Management Aims and Direction	PO6.1 IT Policy and Control Environment PO6.2 Enterprise IT Risk and Control Framework PO6.3 IT Policies Management PO6.4 Policy, Standard and Procedures Rollout PO6.5 Communication of IT Objectives and Direction
PO7 Manage IT Human Resources	PO7.1 Personnel Recruitment and Retention PO7.2 Personnel Competencies PO7.3 Staffing of Roles PO7.4 Personnel Training PO7.5-8 Dependence Upon Individuals, Personnel Clearance Procedures, Employee Job Performance Evaluation, Job Change and Termination
PO8 Manage Quality	PO8.1 Quality Management System PO8.2 IT Standards and Quality Practices PO8.3 Development and Acquisition Standards PO8.4 Customer Focus PO8.5-6 Continuous Improvement, Quality Measurement, Monitoring and Review
PO9 Assess and Manage IT Risks	PO9.1 IT Risk Management Framework PO9.2 Establishment of Risk Context PO9.3 Event Identification PO9.4 Risk Assessment PO9.5-6 Risk Response, Maintenance and Monitoring of a Risk Action Plan
PO10 Manage Projects	PO10.1 Program Management Framework PO10.2 Project Management Framework PO10.3 Project Management Approach PO10.4 Stakeholder Commitment PO10.5-14 Project Scope Statement, Project Phase Initiation, Integrated Project Plan, Project Resources, Project Risk Management, Project Quality Plan, Project Change Control, Project Planning of Assurance Methods, Project Performance Measurement, Reporting and Monitoring, Project Closure

COBIT Domain 2: Acquire and Implement (7 processes, 40 controls)	
Process	**Associated control mechanisms**
AI1 Identify Automated Solutions	AI1.1 Definition and Maintenance of Business Functional and Technical Requirements AI1.2 Risk Analysis Report AI1.3 Feasibility Study and Formulation of Alternative Courses of Action AI1.4 Requirements and Feasibility Decision and Approval
AI2 Acquire and Maintain Application Software	AI2.1 High-level Design AI2.2 Detailed Design AI2.3 Application Control and Auditability AI2.4 Application Security and Availability AI2.5 Configuration and Implementation of Acquired Application Software AI2.6 Major Upgrades to Existing Systems AI2.7 Development of Application Software AI2.8 Software Quality Assurance AI2.9 Applications Requirements Management AI2.10 Application Software Maintenance
AI3 Acquire and Maintain Technology Infrastructure	AI3.1 Technological Infrastructure Acquisition Plan AI3.2 Infrastructure Resource Protection and Availability AI3.3 Infrastructure Maintenance AI3.4 Feasibility Test Environment
AI4 Enable Operation and Use	AI4.1 Planning for Operational Solutions AI4.2 Knowledge Transfer to Business Management AI4.3 Knowledge Transfer to End Users AI4.4 Knowledge Transfer to Operations and Support Staff
AI5 Procure IT Resources	AI5.1 Procurement Control AI5.2 Supplier Contract Management AI5.3 Supplier Selection AI5.4 IT Resources Acquisition
AI6 Manage Changes	AI6.1 Change Standards and Procedures AI6.2 Impact Assessment, Prioritization and Authorization AI6.3 Emergency Changes AI6.4 Change Status Tracking and Reporting AI6.5 Change Closure and Documentation
AI7 Install and Accredit Solutions and Changes	AI7.1 Training AI7.2 Test Plan AI7.3 Implementation Plan AI7.4 Test Environment AI7.5 System and Data Conversion AI7.6 Testing of Changes AI7.7 Final Acceptance Test AI7.8 Promotion to Production AI7.9 Post-implementation Review

COBIT Domain 3: Deliver and Support (13 processes, 71 controls)	
Process	**Associated control mechanisms**
DS1 Define and Manage Service Levels	DS1.1 Service Level Management Framework DS1.2 Definition of Services DS1.3 Service Level Agreements DS1.4 Operating Level Agreements DS1.5 Monitoring and Reporting of Service Level Achievements DS1.6 Review of Service Level Agreements and Contracts
DS2 Manage Third-party Services	DS2.1 Identification of All Supplier Relationships DS2.2 Supplier Relationship Management DS2.3 Supplier Risk Management DS2.4 Supplier Performance Monitoring
DS3 Manage Performance and Capacity	DS3.1 Performance and Capacity Planning DS3.2 Current Performance and Capacity DS3.3 Future Performance and Capacity DS3.4 IT Resources Availability DS3.5 Monitoring and Reporting
DS4 Ensure Continuous Service	DS4.1 IT Continuity Framework DS4.2 IT Continuity Plans DS4.3 Critical IT Resources DS4.4 Maintenance of the IT Continuity Plan DS4.5-10 Testing of the IT Continuity Plan, IT Continuity Plan Training, Distribution of the IT Continuity Plan, IT Services Recovery and Resumption, Offsite Backup Storage, Post-resumption Review
DS5 Ensure Systems Security	DS5.1 Management of IT Security DS5.2 IT Security Plan DS5.3 Identity Management DS5.4 User Account Management DS5.5-11 Security Testing, Surveillance and Monitoring, Security Incident Definition, Protection of Security Technology, Cryptographic Key Management, Malicious Software Prevention, Detection and Correction, Network Security, Exchange of Sensitive Data
DS6 Identify and Allocate Costs	DS6.1 Definition of Services DS6.2 IT Accounting DS6.3 Cost Modeling and Charging DS6.4 Cost Model Maintenance
DS7 Educate and Train Users	DS7.1 Identification of Education and Training Needs DS7.2 Delivery of Training and Education DS7.3 Evaluation of Training Received
DS8 Manage Service Desk and Incidents	DS8.1 Service Desk DS8.2 Registration of Customer Queries DS8.3 Incident Escalation DS8.4 Incident Closure DS8.5 Reporting and Trend Analysis
DS9 Manage the Configuration	DS9.1 Configuration Repository and Baseline DS9.2 Identification and Maintenance of Configuration Items DS9.3 Configuration Integrity Review
DS10 Manage Problems	DS10.1 Identification and Classification of Problems DS10.2 Problem Tracking and Resolution DS10.3 Problem Closure DS10.4 Integration of Configuration, Incident and Problem Management
DS11 Manage Data	DS11.1 Business Requirements for Data Management DS11.2 Storage and Retention Arrangements DS11.3 Media Library Management System DS11.4 Disposal DS11.5 Backup and Restoration DS11.6 Security Requirements for Data Management
DS12 Manage the Physical Environment	DS12.1 Site Selection and Layout DS12.2 Physical Security Measures DS12.3 Physical Access DS12.4 Protection Against Environmental Factors DS12.5 Physical Facilities Management
DS13 Manage Operations	DS13.1 Operations Procedures and Instructions DS13.2 Job Scheduling DS13.3 IT Infrastructure Monitoring DS13.4 Sensitive Documents and Output Devices DS13.5 Preventive Maintenance for Hardware

COBIT Domain 4: Monitor and Evaluate (4 processes, 25 controls)	
Process	**Associated control mechanisms**
ME1 Monitor and Evaluate IT Performance	ME1.1 Monitoring Approach ME1.2 Definition and Collection of Monitoring Data ME1.3 Monitoring Method ME1.4 Performance Assessment ME1.5 Board and Executive Reporting ME1.6 Remedial Actions
ME2 Monitor and Evaluate Internal Control	ME2.1 Monitoring of Internal Control Framework ME2.2 Supervisory Review ME2.3 Control Exceptions ME2.4 Control Self-assessment ME2.5 Assurance of Internal Control ME2.6 Internal Control at Third Parties ME2.7 Remedial Actions
ME3 Ensure Compliance With External Requirements	ME3.1 Identification of External Legal, Regulatory and Contractual Compliance Requirements ME3.2 Optimization of Response to External Requirements ME3.3 Evaluation of Compliance With External Requirements ME3.4 Positive Assurance of Compliance ME3.5 Integrated Reporting
ME4 Provide IT Governance	ME4.1 Establishment of an IT Governance Framework ME4.2 Strategic Alignment ME4.3 Value Delivery ME4.4 Resource Management ME4.5 Risk Management ME4.6 Performance Measurement ME4.7 Independent Assurance

ValIT Domain 1: Value Governance (6 processes, 25 activities)	
Process	**Associated activities**
VG1 Establish informed and committed leadership	VG1.1 Develop an understanding of the significance of IT and the role of governance. VG1.2 Establish effective reporting lines. VG1.3 Establish a leadership forum. VG1.4 Define value for the enterprise. VG1.5 Ensure alignment and integration of business and IT strategies with key business goals.
VG2 Define and implement processes	VG2.1 Define the value governance framework. VG2.2 Assess the quality and coverage of current processes. VG2.3 Identify and prioritize process requirements. VG2.4 Define and document the processes. VG2.5 Establish, implement and communicate roles, responsibilities and accountabilities. VG2.6 Establish organizational structures.
VG3 Define portfolio characteristics	VG3.1 Define portfolio types. VG3.2 Define categories (within portfolios). VG3.3 Develop and communicate evaluation criteria (for each category). VG3.4 Assign weightings to criteria. VG3.5 Define requirements for stage-gates and other reviews (for each category).
VG4 Align and integrate value management with enterprise financial planning	VG4.1 Review current enterprise budgeting practices. VG4.2 Determine value management financial planning practice requirements. VG4.3 Identify changes required. VG4.4 Implement optimal financial planning practices for value management.
VG5 Establish effective governance monitoring.	VG5.1 Identify key metrics. VG5.2 Define information capture processes and approaches. VG5.3 Define reporting methods and techniques. VG5.4 Identify and monitor performance improvement actions.
VG6 Continuously improve value management practices.	VG6.1 Implement lessons learned.

ValIT Domain 2: Portfolio Management (6 processes, 23 activities)	
Process	**Associated activities**
PM1 Establish strategic direction and target investment mix	PM1.1 Review and ensure clarity of the business strategy and goals. PM1.2 Identify opportunities for IT to influence and support the business strategy. PM1.3 Define an appropriate investment mix. PM1.4 Translate the business strategy and goals into IT strategy and goals.
PM2 Determine the availability and sources of funds	PM2.1 Determine overall investment funds.
PM3 Manage the availability of human resources	PM3.1 Create and maintain an inventory of business human resources. PM3.2 Understand the current and future demand (for business human resources). PM3.3 Identify shortfalls (between current and future business human resource demand). PM3.4 Create and maintain tactical plans (for business human resources). PM3.5 Monitor, review and adjust (business function allocation and staffing). PM3.6 Create and maintain an inventory of IT human resources. PM3.7 Understand the current and future demand (for IT human resources). PM3.8 Identify shortfalls (between current and future IT human resource demand). PM3.9 Create and maintain tactical plans (for IT human resources). PM3.10 Monitor, review and adjust (IT function allocation and staffing).
PM4 Evaluate and select programs to fund	PM4.1 Evaluate and assign relative scores to program business cases. PM4.2 Create an overall investment portfolio view. PM4.3 Make and communicate investment decisions. PM4.4 Specify stage-gates and allocate funds to selected programs. PM4.5 Adjust business targets, forecasts and budgets.
PM5 Monitor and report on investment portfolio performance	PM5.1 Monitor and report on investment portfolio performance.
PM6 Optimize investment portfolio performance	PM6.1 Optimize investment portfolio performance. PM6.2 Reprioritize the investment portfolio.

ValIT Domain 3: Investment Management (10 processes, 21 activities)	
Process	**Associated activities**
IM1 Develop and evaluate the initial program concept business case	IM1.1 Recognize investment opportunities. IM1.2 Develop the initial program concept business case. IM1.3 Evaluate the initial program concept business case.
IM2 Understand the candidate program and implementation options	IM2.1 Develop a clear and complete understanding of the candidate program. IM2.2 Perform analysis of the alternatives.
IM3 Develop the program plan.	IM3.1 Develop the program plan.
IM4 Develop full life-cycle costs and benefits	IM4.1 Identify full life-cycle costs and benefits. IM4.2 Develop a benefits-realization plan. IM4.3 Perform appropriate reviews and obtain sign-offs.
IM5 Develop the detailed candidate program business case	IM5.1 Develop the detailed program business case. IM5.2 Assign clear accountability and ownership. IM5.3 Perform appropriate reviews and obtain sign-offs.
IM6 Launch and manage the program	IM6.1 Plan projects, and resource and launch the program. IM6.2 Manage the program. IM6.3 Track and manage benefits.
IM7 Update operational IT portfolios	IM7.1 Update operational IT portfolios.
IM8 Update the business case	IM8.1 Update the business case.
IM9 Monitor and report on the program	IM9.1 Monitor and report on program (solution delivery) performance. IM9.2 Monitor and report on business (benefit/outcome) performance. IM9.3 Monitor and report on operational (service delivery) performance.
IM10 Retire the program	IM10.1 Retire the program.

APPENDIX F: GT PROCESSES IN THE LITERATURE

Laperrière (1997)	Desgagné (2005)
1. Definition of the research topic: (1) the research topic can be defined through both theoretical and practical preoccupations, (2) the definition can be broad at the beginning of the research and can narrow down eventually 2. Selecting the site, group or situation to study: (1) the scientific relevance of the group, site or situation with regards to the research question, and (2) the capacity of the group or situation to shed the light on the studied phenomenon. The sampling and the coding are normally conducted in parallel. Data collection should stop only when a conceptual saturation is obtained. 3. Elaborating the conceptual categories: (1) the basic unit of analysis in the GT approach is the Concept, (2) the goal is to establish the structural limits of facts through the concept they represent, (3) the categories are constantly revised until no additional data will contradict them (saturation), (4) once the conceptual saturation reached, their properties are clarified, (5) then their dimensions are investigated (their quantity, intensity and scope), (6) use the occurrences (and frequencies) to build patterns or types (Strauss and Corbin, 1990). 4. The coding process and comparative analysis: (1) the coding process is open at the beginning and aims at generating a large number of concepts and categories, (2) the researcher then looks for relationships between the categories found with the goal of integration (axial coding), (3) selective coding leads to the creation of central categories and in turn the emergence of patterns.	THE RESTITUTIVE POSTURE 1. Define research objectives and scope 2. Prepare the respondents: (a) make sure the responded will focus on one single event and will talk about their practice, (b) help the responded adopt a deliberate mode of narration. 3. Conduct the interview and cooperate: (a) adopt a comprehensive attitude, (b) find out about the episodes of the story and event, (c) ask questions in a way to get the responded to describe his actions and decisions 4. Transcribe the interviews and co-produce the stories. THE ANALYTICAL POSTURE 1. The conceptual definition and the epistemological status of the material: (a) the sociological roots focus on the narrative of respondents, (b) the literary tradition looks at the message and how it makes sense from the relevant literary perspectives. 2. The comparative method leading to a typology: (a) the typology emerges throughout the data collection process, once a sufficient number of interviews conducted, (b) two theoretical perspectives can be adopted: (1) the GT perspective where the researcher shifts gradually from open coding to axial coding, (2) the typological analysis perspective where groups of cases are created inductively through a condensation process and families created. 3. Structuring the stories into prototypes: (a) the process that transforms the voices of respondents into one single voice (the researcher's voice), (b) the prototypes found have two purposes: (1) they provide an analytical function for the rest of the material, and (2) they represent the results of the research

APPENDIX G: THE STRATEGIC MOTIVATIONS

The depth in the explanation of the project's strategic motivations and importance indicates the IT manager's (or CIO's) level of participation in the strategic process. The IT manager's understanding of the client needs, behaviors and marketing issues indicates his strong internal relationships with other critical business functions like sales and marketing. These relationships indicate the extent to which IT is strategic in certain firms. Each one of the seven primary strategic motivations is described in the next pages supported and illustrated by excerpts form the interviews. The themes reflect the initial strategic intent and importance of each IT initiative selected in the study.

Business Transformation & Integration

This theme describes the transformation of major inefficient or ineffective processes at the core of the business and includes BPR (Business Process Reengineering) and centralization motivations. The major raison d'être of the strategic IT initiatives in this work was business transformation and integration. The initiatives are used as opportunities to re-engineer, transform, integrate and standardize major business processes in the firm. Business transformation, integration and the centralization and control of business processes (information processing) are motives that all the projects shared to some extent. The IT-Enabled Exploitative Innovation theme introduced in the next chapter complements this theme in that it reflects the business transformation and efficiency results of the IT initiative as opposed to its business transformation and efficiency intents.

Strategic Motivations (primary themes)	1A: DDS-THEME PARK	1B: BASEL II-BANK	1C: PLM-AEROSPACE1	2A: MC-OPTIC	2B: PLM-ENERGY	2C: ERP-FOOD	3A: CRM-POST	3B: CRM-ENERGY	3C: CRM-RESORTS	4A: EHR-HEALTH	4B: ECM-DEFENSE	4C: CM-INSURANCE	5A: PLM-AEROSPACE2	5B: PLM-ELECTRONICS	5C: ERP-RETAIL	6A: ESE-FINANCE	6B: AD-BANK	6C: PLM-TOYS	**TOTAL**	**% OF CASES COVERED**	**SHARE OF TOTAL OCCURENCES**
1: Business Transformation & Integration	5	2	11	2	4	8	3	9	1	8	4	10	6	7	3	3	5	2	**93**	**100%**	**30%**
2: New Capabilities & Mass Customization	4	6	7	8	5	3	0	2	6	9	7	1	2	1	0	1	0	3	**65**	**89%**	**21%**
3: Efficiency & Cost Reduction	4	0	0	0	1	3	2	6	2	8	4	0	1	2	3	1	4	2	**43**	**78%**	**14%**
4: Innovation & Growth	4	3	0	7	7	0	1	0	1	0	0	1	3	3	0	1	0	1	**32**	**61%**	**10%**
5: Replacing Legacy Systems	0	0	8	0	0	2	1	8	0	0	1	9	1	0	2	0	0	0	**32**	**50%**	**11%**
6: Client Satisfaction	4	1	1	0	0	0	0	15	0	0	1	0	0	0	0	0	0	0	**22**	**28%**	**7%**
7: Response to Competition	0	1	0	11	0	0	0	6	0	0	0	0	2	0	0	0	0	0	**20**	**22%**	**7%**
TOTAL	**21**	**13**	**27**	**28**	**17**	**16**	**7**	**46**	**10**	**25**	**17**	**21**	**15**	**13**	**8**	**6**	**9**	**8**	**307**	**100%**	**100%**

The table below presents excerpts for Business Transformation from the case interviews.

Excerpts for Business Transformation & Integration	
Project	**Examples from interviews**
PLM-AEROSPACE1	- *There are a lot of similarities between ERP, SAP type of software, and PLM in the sense that SAP was used to integrate the systems and the process on the execution side, what we're trying to do with PLM is to do something similar: integrate the people, integrate the data, the processes but on the product development side.*
CM-INSURANCE	- *Our view in integrating Citadelle as a company as opposed to the system: to a large extent we could take the data off their systems and put it into ours and shut down their systems.*
CRM-ENERGY	- *Our objective was for 80% of the business to be supported by our system.*
EHR-HEALTH	- *The first stage was to integrate all hospital information into a single clinical tool.*
PLM-AEROSPACE2	- *The goal was to have an integrated system, a single source of data.*
ECM-DEFENSE	- *Five years ago, IT was completely decentralized and I asked for it to be centralized, unify solutions, etc.*
PLM-ENERGY	- *Basically all that [the company] wanted to achieve was a 3D system to design equipment such as ventilators, evacuators, etc. But we showed them that, it's all very well having that but it is necessary to manage your data, collaborate on your data with suppliers, and before you know it, you will have a system such as SAP, connected systems, etc.*
CRM-POST	- *The SAP part of the project was framed around a larger initiative that we called Business Transformation which was about changing the way we did things to: (1) reduce our operating costs, (2) become more efficient, and (3) create better platforms for growth*
ESE-FINANCE	- *It was an extremely large, extremely mission-critical part of the country's financial landscape; the entire banking infrastructure and stock exchange infrastructure had to be connected and integrated on this system.*

The excerpts presented here mainly account for:

- The extent to which the initiatives will transform the organization, enhance its processes and impact upon the work of its employees
- The way the initiatives are intended to integrate, centralize and control business processes

The emphasis on this particular strategic motivation indicates the amplitude and scale of the project and its critical impact on the majority of the divisions in the organization. The theme is a strong indicator of major business process innovation as opposed to product innovation or the creation of new revenue streams and markets.

The buyer's strategy in the ERP-FOOD case for example was to standardize business processes throughout the company's 80 business units and to scale down the ERP application to make the integration of smaller units feasible and affordable. Coordinating the company's global operations was becoming an extremely challenging task and the new platform offered fast and

straightforward integration solutions. Here is a quote by the respondent describing the integration and centralization process:

> *Another characteristic is to institute a single core model in all subsidiaries in spite of a somewhat decentralized group culture.*

New Capabilities & Mass Customization

This theme indicates the way in which IT initiatives are used to build new organizational capabilities (including mass customization) that lead to a competitive advantage. For example, the mass customization capability was an initial motivation in three cases (DDS-THEME PARK, MC-OPTIC and CRM-RESORTS).

Excerpts for New Capabilities & Mass Customization	
Project	**Examples from interviews**
EHR-HEALTH	- *[We wanted to develop] functions for consulting digitized files, for example such as [sending] all results to boxes so that the doctors can consult them immediately […] etc.*
MC-OPTIC	- *Mass customization was one of the initial objectives and in any case it will become [more] widespread.*
ECM-DEFENSE	- *So this is one of the things that I alluded to earlier that we cited without giving any figures (impact on innovation). Therefore, in the following order, firstly it was about creating the capacity to connect people in a network and to capitalize on knowledge in the group, different units or countries.*
PLM-AEROSPACE1	- *PLM looks at the product definition: when we design a new product, we wanted to be able to iterate very quickly, to collaborate, we wanted to control the configuration of your data because we are looking at different designs and solutions concurrently.*
BASEL II-BANK	- *In contrast, when the program started, in the area of credit risk we were much more advanced because it is something that we have been doing for a long time, we were not involved in the field of markets, operational risk, and integrated risk management. I may be exaggerating but only slightly.*
CRM-RESORTS	- *The objective was to address potential clients through direct distribution channels such as telephone and Internet in order to simplify things.*
PLM-ENERGY	- *In fact, we were the first to talk about ALM, that PLM would take them to ALM (Asset Lifecycle Management). That PLM was the starting point.*
DDS-THEME PARK	- *[The objective was to develop] a system that enables product mass customization.*

IT systems contain functionalities that once deployed in organizations and applied to existing or new business processes can create powerful and game-changing capabilities. These projects were intended to build new capabilities such as the remote monitoring of subsidiaries, direct sales through B2C channels, the translation of R&D knowledge and theories into effective programs, the capability to propose medical intervention plans to doctors and nurses, and the capability to serve clients in a more effective way. Here is what the respondent in the CRM-ENERGY case said about the new system's capabilities:

When these three things are in place, the employee's ability to do things with a client is multiplied 50-fold.

Mass customization is one of the most highlighted capabilities in this research and one that seems to have strong links to innovation. It is clearly one of the best ways for IT to contribute effectively to business innovation.

Efficiency & Cost Reduction

Most IT initiatives are intended to reduce cost and increase the efficiency of existing operations. Even growth-oriented initiatives needed to make economic sense with a short or medium term ROI for acceptance. Typically, returns on innovation investments are slower than returns on efficiency investments. This explains the need to combine both innovation and efficiency in IT initiatives to maintain balance, control and motivation. The following table presents excerpts for the theme in the sample of selected IT initiatives:

Excerpts for Efficiency & Cost Reduction	
Project	**Examples from interviews**
EHR-HEALTH	- *A first study was conducted in concert with the agency and a private firm, which found that simply digitizing files for the space was not sufficient and that the project was not self-financing.* - *Therefore […] in our opinion the strategy is first and foremost to try to reduce costs.*
CRM-ENERGY	- *Second strategic direction: at the time the distributor [of the group], was not profitable. Therefore it was necessary to improve our processes and the IT supporting our processes …* - *So second objective: efficiency*
DDS-THEME PARK	- *So why the project? First reason is very simple: reduce cost, therefore less commissions for BtoB. Second example: more online sales, less sales at the call center, let's say negligible reservation acquisition costs.*
ECM-DEFENSE	- *And therefore we did a ROI calculation for the savings that we would make using this new solution.*
AD-BANK	- *The aim was efficiency and flexibility with a partner like ITC Infotech who could ramp-up and down with business cycles.*
ERP-FOOD	- *At the end of the 90s people on the executive committee realized that the Top Line was good but that it was not enough, we needed both the Top Line and Bottom Line.*

Two-thirds of the respondents explicitly linked their projects to efficiency and cost reduction. The other third of the projects were triggered by factors other than efficiency and cost reduction, such as innovation, quality and customer satisfaction. According to the CIO in the CRM-RESORTS case, efficiency was the major strategic driver behind all of the CRM projects he worked on. However, efficiency was not the sole aim of the CRM project in question, as it also

sought to generate growth (by promoting direct online reservations) and the mass customization of the company's marketing capability.

Innovation & Growth

This theme reflects the way in which IT initiatives were directly intended to stimulate innovation and growth, and to create new markets. If innovation and growth were not motivations for all system buyers (mentioned in 7 cases), they were certainly motivations for most vendors and consultants who saw these large complex projects as opportunities to learn and build new products and services. Excerpts for the theme are presented in the following table:

Excerpts for Innovation & Growth	
Project	**Examples from interviews**
MC-OPTIC	- *The objective being, I wouldn't say to take back control, but rather to benefit from a new technology, to benefit from a new business model and get back into the race. Therefore we will move from 'we make molds, etc.' to things that generate added value and therefore information manipulation.*
PLM-ENERGY	- *Nor had they thought that the PLM could give them such an advantage, this is where we contributed to a slight paradigm shift, at the beginning they watched, making 3D models, stupidly, using 2D.*
DDS-THEME PARK	- *The core business is restricted to hotel stays and entrance tickets to parks, it is not, for example, property development, and therefore it was truly about growth in core business revenues and margins.*
CM-INSURANCE	- *We're the only company from a business side that understood something called Average Reserving. So we have a lot of knowledge about how you manage things like average reserving which Guidewire didn't understand before they talked to us. They needed us to improve their solution and innovate.*
CRM-POST	- *[The goal was] to create a platform for growth as we go forward.*

In several cases, the IT initiative served as a means to build new products and services and to help the firm to penetrate new markets. In some cases the buyer had the intention to innovate and create new markets from the beginning, in other cases the buyer discovered the opportunity along the way and decided to enter into a joint venture with the IT supplier. Here is an example of a buyer's initial intent to innovate from the MC-OPTIC case:

> *The idea behind the project was therefore to say […] we can provide you with the programs which will enable you to calculate the surface finely - what's known as lens design, and we will provide you with the processes that will enable you to use these machines and we will do all this in the form of a Web service, i.e. there will be a platform somewhere which will become the Google of optic calculations and quite simply all you will have to do is input an order and your machine will call up our Web service directly*

which will reply with the surface and order it directly from the tool and the linear motor. This is basically the idea.

In the above example the respondent describes a totally innovative business model. Instead of just producing optic lenses, the firm wanted to start selling software tools to operate digital surfacing machines.

This Innovation & Growth theme was relatively rare in the sample. Not surprisingly, the ERP-FOOD, CRM-ENERGY and ECM-DEFENSE initiatives are amongst those initiatives because they emphasized efficiency, process transformation, business integration and the replacement of legacy systems as opposed to innovation and growth. However, initiatives with no initial intent to stimulate innovation and growth could end up having important (and often unexpected) effects on innovation, especially on a system level. This process can be extremely beneficial for both the system supplier and the buyer who collaborate in an open innovation fashion.

Replacing Legacy Systems

This theme describes the importance of replacing the legacy systems (silos) that lack agility and that are hard and very costly to synchronize with new integrated systems. The accumulation of legacy systems in the various departments of a firm increases the complexity of the firm's IT environment and causes serious communication, efficiency and quality problems. Many of the projects studied here were designed to address these legacy problems and in some cases the replacement of legacy systems was one of the projects' major objectives.

The theme is the only strategic motivation that did not occur at all in initiatives aimed at innovation and growth. Excerpts describing the way in which IT initiatives aim at replacing legacy systems are presented in the table below:

Excerpts for Replacing Legacy Systems	
Project	**Examples from interviews**
CM-INSURANCE	- *When I arrived here 4 years ago as the CIO, I convinced my boss that we had to do some significant amounts of yearly housekeeping to shut down some of these legacy issue problems. We have to get away from COBOL and RPG, these old languages, just because it's getting tougher and tougher to find the people to write code with that stuff. Their value is on the rise, if you can find them.* - *The legacy problem that we had did not satisfy our business needs and we cannot be leisurely in how we address legacy issues here.*
CRM - ENERGY	- *At the time we had 250 systems that had developed over time, which did not talk to each other, which did not allow us to evolve, our Billing Engine, the bones of our information system, dates from 1976.*
ERP - FOOD	- *The standards logic is extremely easy, the manner in which we explain it to a subsidiary is that if you have a tool which is not standard but which works perfectly well, which is not expensive, etc. if you like it, keep it, on the other hand if you have a problem with it and you need to change for any reason, it's too expensive, it's broken, it's been stolen, then you can evolve towards the standard; which, after a few years, results in convergence in terms of the implemented applications road map.*
ERP-RETAIL	- *The mandate was to replace 40 legacy systems with one integrated system.*
CRM - POST	- *So he was the driver behind it at the executive level and through the Business Transformation initiative, which was aimed at replacing legacy systems.*
ECM - DEFENSE	- *And this would enable us to migrate from a heterogeneous, still fragmented world involving several solutions, in particular for the messaging part we currently have three types of solutions, this is due to the group's history, it is due to the fact that the group has in part grown through acquisition therefore people will be happy to return to a single solution.*

Initiatives that aim at replacing a large number of legacy systems like those in the above table could be extremely risky since mission-critical and company-wide business processes are affected and very large numbers of employees must be asked to change their work habits and to learn new systems and methods. This could in turn create problems of serious resistance to change. In some cases, hundreds of legacy systems are replaced simultaneously, such as in the CRM-ENERGY case where the new integrated platform replaced 250 legacy systems.

The consolidation of system vendors is accelerating the replacement of legacy systems in some industries. For instance, while the aerospace company (PLM-AEROSPACE1) could replace all of its legacy systems with the fully integrated PLM platform, the theme park (DDS-THEME PARK) had to connect its new applications with its best-of-breed legacy systems because the specialized software vendors in the travel industry are still independent and leaders in their fields. On the other hand, the specialized and independent software vendors in the mechanical design industry are almost nonexistent. In certain situations, such as in the aerospace industry, the integration, coordination and efficiency advantages of single integrated platforms far outweigh the advantages of best-of-breed and fully adapted applications.

Client Satisfaction

The client in question is the system buyer's client. The table below presents excerpts for the theme from the interviews.

Excerpts for Client Satisfaction	
Project	**Examples from interviews**
CRM-ENERGY	- *This was the starting point: what does the client want, what will it want tomorrow?* - *What we call benchmarking is analyzing a client's needs. Here is our services offer, what about it?*
DDS-THEME PARK	- *The challenge, the specific business objective, out of the several that we have: visitor satisfaction […]* - *The first thing was to build a Website in particular BtoC but in particular a Website which was Customer Centric which presupposes that we have worked on our client segmentation, therefore rather than being Product Centric, we have said it may be of interest to families with children, it may be of interest to young adults, etc. Therefore a Website with rich content, etc.*
BASEL II-BANK	- *It is a notion of capitalization to ensure that in the event of bankruptcy or in the event that there are any problems there is a supplementary fund to refund clients their money.*
PLM-AEROSPACE1	- *Now we are actually becoming an extension of our client's aircraft development, so we're developing in a digital mockup environment. The supply chain has now been extended to the point where we've become an arm of them. We're no longer just a supplier we're an integrator.*
ECM-DEFENSE	- *Yes, I haven't said it but it is obvious. These tools, everything that I have mentioned, are only for internal company use, they are designed to improve collaboration with clients, and this is the initial key vocation of the project.*

Surprisingly, only one respondent in the three CRM projects explicitly mentioned the Client Satisfaction motivation. In both the CRM-POST and the CRM-RESORTS cases, Client Satisfaction was not highlighted. One reason is the project's aim of penetrating a new market, rather than increasing the satisfaction of clients in current markets.

Response to Competition

This theme reflects the firm's intention to use IT in response to competitive moves by newcomers in the industry using IT systems to improve their products and attract customers. In the MC-OPTIC case, the company's decision to invest in mass customization and in more sophisticated IT systems was not mainly triggered by market demand. The company's major markets in Europe were not asking for innovations. Instead, the major triggers were the threat of being five years behind Japanese competitors in the use of digitized processes and the threat of losing market shares to small start-ups who build their business models around innovative IT systems. See excerpts for the theme in the table below:

Excerpts for Response to Competition	
Project	**Examples from interviews**
MC-OPTIC	- *Effectively the competitive norm is to develop these new technologies, barbarians might slip in by the back door, but we will repel them, but our motivations were strategic because we feel that it is the future.*
CRM-ENERGY	- *We knew that we had a monopoly in Quebec, apart from in Westmount or Sherbrooke. On the other hand, the client receives other services; it can call its telephone provider, its bank, and then have transactions with these suppliers. Therefore the client compares Hydro Québec to other providers of telephone, cable services, etc.*
BASEL II-BANK	- *Therefore we were lagging well behind the others and the others adopted an information management approach, as many management indicators are required at executive level this meant that they went into integrated information systems, therefore a pure data approach.*

APPENDIX H: THE QUALITATIVE ANALYSIS JOURNAL

In this journal, all steps and decisions that led to conceptual saturation and the construction of the final and stable classification structure of themes were written. Maintaining a detailed journal of the analysis process is a critical task in qualitative methodologies given the constant need for adjustments and the large amount of data to process. Seven coding iterations were needed to reach the final classification structure and to stabilize the conceptual model with its key categories.

Iteration 1

Themes development throughout the 3 cases in Iteration 1:

Theme Blocks	A: DDS-THEME PARK	B: BASEL II-BANK	C: PLM-AEROSPACE1	TOTAL
1: Project Governance	13	5	5	**23**
2: Intra-Organizational Governance	11	3	0	**14**
3: Inter-Organizational Governance	17	3	5	**25**
4: Innovation	7	1	0	**8**
TOTAL	48	12	10	**70**

The above table indicates the number of themes created for every block (vertical axis) in every interview (horizontal axis). This table shows the coding frequency in the first three iterations before adjustments.

Theme Blocks	A: DDS-THEME PARK	B: BASEL II-BANK	C: PLM-AEROSPACE1	TOTAL
1: Project Governance	54	69	45	168
2: Intra-Organizational Governance	36	28	14	78
3: Inter-Organizational Governance	70	40	73	183
4: Innovation	35	13	17	65
TOTAL REFERENCES	**195**	**150**	**149**	**494**

The following three adjustment processes were used:

1. Combination of case-specific and weak themes to stronger themes
2. Separation of general themes into more precise sub-themes
3. Recoding previously analyzed content with new pertinent themes (this happens when the new theme is a sub-category of an existing theme).

The table describes the first two adjustment processes in Iteration 1:

Iteration 1 Adjustments			
Theme	**Iteration**	**Blocks impacted**	**Adjustments**
1. Evaluate Strategic Advantage	- C: PLM-AEROSPACE1	- Project Governance - Strategic Motivations	- Renamed: Strategic Business Process - Moved from Project Characteristics to Strategic Motivations
2. Legacy Systems	- C: PLM-AEROSPACE1	- Project Governance - Strategic Motivations	- Renamed Replacing Legacy Systems - Moved from Project Characteristics to Strategic Motivations
3. Technical Difficulty	- B: BASEL II-BANK	- Project Governance	- Removed - Content coded in Changes and Complexity
4. Build on Legacy Systems	- A: DDS-THEME PARK	- Project Governance	- Renamed: Connecting Legacy Systems
5. Method	- A: DDS-THEME PARK	- Project Governance	- Removed - Content coded in Size (method used to determine size)
6. Special Team	- A: DDS-THEME PARK	- Project Governance	- Removed - Content coded in Project Team
7. IT Roles and Competences	- A: DDS-THEME PARK	- Project Governance - Intra-Org. Governance	- Moved from General Relationships to Internal Relationships
8. New Projects	- A: DDS-THEME PARK	- Intra-Org. Governance	- Removed - Content coded in Performance Criteria, Strategic Importance, General Perception and Respondent Profile.
9. New IT Capabilities	- A: DDS-THEME PARK	- Intra-Org. Governance	- Defined with more clarity - Some content coded in Switch-Use Capabilities
10. Hybrid People	- A: DDS-THEME PARK	- Intra-Org. Governance	- Removed - Content coded in Team Selection Process and IT Roles and Competences
11. Offshore Development	- A: DDS-THEME PARK	- Inter-Org. Governance	- Removed - Content coded in Externalization
12. Software as Service - ASP	- A: DDS-THEME PARK	- Inter-Org. Governance	- Removed - Content coded in Contract Management
13. Partner Selection >Technical & >Business	- A: DDS-THEME PARK	- Inter-Org. Governance	- Removed - Content coded in Consultant Selection Process
14. Partner Selection >Social	- A: DDS-THEME PARK	- Inter-Org. Governance	- Renamed: Social and Personal Contacts
15. Funding Capability	- C: PLM-AEROSPACE1	- Project Governance	- Re-used to code previously analyzed content - Content was coded with the new theme in case 1A (1 reference)

Most of the adjustments were brought to themes created in Iteration A with DDS-THEME PARK. More precisely, 11 themes created during Iteration A were adjusted or removed. The removal or combination (merger) of very detailed themes increases with the heterogeneity of the

analyzed cases. In Iteration 1, 15 out of 70 themes were adjusted (an adjustment rate of 20%) and 1 theme (Funding Capability) was used to re-code previously analyzed content. Funding Capability was added during the coding of case 1C (PLM-AEROSPACE1) and was then reused to code text in case B (BASEL II-BANK).

This process is triggered only if the researcher has the ability to memorize the important issues discussed in each case. It is also enhanced if the cases are all analyzed in a short period of time. The low number of themes used to code previously analyzed content is a good indicator of the pertinence of the classification structure.

Themes structure development in Iteration 1 after structural adjustments:

Theme Blocks	A: DDS-THEME PARK	B: BASEL II-BANK	C: PLM-AEROSPACE1	TOTAL
1: Project Governance	10	4	3	**17**
2: Intra-Organizational Governance	10	3	0	**13**
3: Inter-Organizational Governance	13	3	5	**21**
4: Innovation	7	1	0	**8**
TOTAL	40	11	8	**59**

The adjustments conducted after Iteration 1 brought down the number of themes from 70 to 59. All case-specific themes (non comparable) were removed and their content was coded with other more general and comparable themes.

Coding frequency (reference density) after adjustments:

Theme Blocks	A: DDS-THEME PARK	B: BASEL II-BANK	C: PLM-AEROSPACE1	TOTAL
1: Project Governance	53	66	37	**156**
2: Intra-Organizational Governance	31	31	14	**76**
3: Inter-Organizational Governance	70	40	73	**183**
4: Innovation	40	13	17	**70**
TOTAL	**194**	**150**	**141**	**485**

After adjustments, the number of reference in each interview did not change. However, the distribution of the references along the themes and the theme blocks changed. For example, the number of references in the Intra-Organizational Governance block decreased from 78 to 76.

Iteration 2

Iteration 2 was conducted over the adjusted Iteration 1 classification structure containing 59 themes. This table shows the development of themes in Iteration 1 and Iteration 2 before Iteration 2 adjustments:

Theme Blocks	A: DDS-THEME PARK	B: BASEL II-BANK	C: PLM-AEROSPACE1	A: MC-OPTIC	B: PLM-ENERGY	C: ERP-FOOD	TOTAL
1: Project Governance	10	4	3	1	0	0	**18**
2: Intra-Organizational Governance	10	3	0	4	0	2	**19**
3: Inter-Organizational Governance	13	3	5	2	2	0	**25**
4: Innovation	7	1	0	0	0	0	**8**
TOTAL	40	11	8	7	2	2	**70**

This table shows the reference frequency (density) for every block in every interview before the adjustments in Iteration 2:

Theme Blocks	A: MC-OPTIC	B: PLM-ENERGY	C: ERP-FOOD	TOTAL
1: Project Governance	36	49	29	114
2: Intra-Organizational Governance	61	30	67	158
3: Inter-Organizational Governance	48	74	24	146
4: Innovation	20	28	26	74
TOTAL REFERENCES	**165**	**181**	**146**	**492**

The table describes the combination and separation adjustments at the end of Iteration 2:

Iteration 2 Adjustments			
Theme	**Iteration**	**Blocks impacted**	**Adjustments**
1. Connecting Legacy Systems	- A: DDS-THEME PARK	- Project Governance	- Removed - Content coded in Function Approach
2. Function Approach	- B: BASEL II-BANK	- Project Governance	- Renamed to Function and BOB (Best of Breed) Approach
3. Leadership & Vision	- B: BASEL II-BANK	- Project Governance - Intra-Org. Governance	- Removed - Content coded in Internal Demand
4. Internal Demand	- A: DDS-THEME PARK	- Intra-Org. Governance	- Renamed to Internal Demand and Vision
5. Vendor Stability	- B: BASEL II-BANK	- Inter-Org. Governance	- Removed - Content coded in Vendor Selection Process
6. IT Architecture Innovations	- A: DDS-THEME PARK	- Innovation	- Removed - Content coded in IT Innovations
7. Lessons Learned	- A: DDS-THEME PARK	- Innovation - Project Governance	- Removed - Content coded in Performance Criteria and Project Reviews

The weakest themes, the ones only found in one case, were identified, and then their content was re-analyzed and coded under a different and more pertinent theme.

Yet, some of these weak themes were kept in Iteration 2 (the conceptually relevant ones) in case they would be reused. Those reused in Iteration 2 like Joint Activities (in block 2) were not removed but most of those not reused like Connecting Legacy Systems (in block 2) were removed. If non-reused themes were conceptually relevant and totally exclusive if compared to other themes like Applications Knowledge, they were kept. Weeks and Feeny (2008) used a similar factor they called Technical Knowledge in their Client Enablers category.

Similarly, some weak themes created in Iteration 2 (themes used only once) were kept for their conceptual relevance. Examples of such themes are R&D Role, IS Universities, Governance System, and IT Strategy and Organization. Such relevant themes can eventually be reused in future iterations or possibly in previously coded interviews. Themes structure development in Iteration 2 after structural adjustments:

Theme Blocks	A: DDS-THEME PARK	B: BASEL II-BANK	C: PLM-AEROSPACE1	A: MC-OPTIC	B: PLM-ENERGY	C: ERP-FOOD	TOTAL
1: Project Governance	9	3	3	1	0	0	**16**
2: Intra-Organizational Governance	10	3	0	4	0	2	**19**
3: Inter-Organizational Governance	13	2	5	2	2	0	**24**
4: Innovation	5	1	0	0	0	0	**6**
TOTAL	37	9	8	7	2	2	**65**

This table shows the reference frequency (density) for every block in every interview after the adjustments in Iteration 2:

Theme Blocks	A: DDS-THEME PARK	B: BASEL II-BANK	C: PLM-AEROSPACE1	A: MC-OPTIC	B: PLM-ENERGY	C: ERP-FOOD	TOTAL
1: Project Governance	60	61	37	36	49	29	272
2: Intra-Organizational Governance	31	36	14	61	30	67	239
3: Inter-Organizational Governance	70	40	73	48	74	24	329
4: Innovation	39	13	17	20	28	26	143
TOTAL CODES	**200**	**150**	**141**	**165**	**181**	**146**	**983**

The Iteration 2 adjustments affected the number and the inter-block distribution of theme references of two cases analyzed during Iteration 1: DDS-THEME PARK and BASEL II-BANK. The inter-block distribution of theme references for the three cases analyzed in Iteration 2 (MC-OPTIC, PLM-ENERGY and ERP-FOOD) remained unchanged. The case theme blocks (cells in the above table) where the number of theme references changed were grayed.

The total number of theme references for the six first cases slightly increased because certain content in the DDS-THEME PARK case was coded using additional themes.

Iteration 3

Iteration 3 was conducted over the adjusted Iteration 2 classification structure containing 65 themes. This table shows the development of themes in Iteration 1, Iteration 2 and Iteration 3 before Iteration 3 adjustments:

Theme Blocks	A: DDS-THEME PARK	B: BASEL II-BANK	C: PLM-AEROSPACE1	A: MC-OPTIC	B: PLM-ENERGY	C: ERP-FOOD	A: CRM-POST	B: CRM-ENERGY	C: CRM-RESORTS	TOTAL
1: Project Governance	9	3	3	1	0	0	0	2	0	**18**
2: Intra-Organizational Governance	10	3	0	4	0	2	0	0	0	**19**
3: Inter-Organizational Governance	13	2	5	2	2	0	0	0	0	**24**
4: Innovation	5	1	0	0	0	0	0	0	0	**6**
TOTAL	37	9	8	7	2	2	0	2	0	**67**

The table below shows the reference frequency (density) for every block in every interview analyzed in Iteration 3 (before the minor adjustments):

Theme Blocks	A: CRM-POST	B: CRM-ENERGY	C: CRM-RESORTS	TOTAL
1: Project Governance	49	45	44	138
2: Intra-Organizational Governance	22	22	39	83
3: Inter-Organizational Governance	28	41	46	115
4: Innovation	8	16	6	30
TOTAL REFERENCES	**107**	**124**	**135**	**366**

Themes created in Iteration 1 and Iteration 2 and only used in one or two cases (the weaker themes) are identified and some may be merged with existing and less specific themes.

At this point, most of the weak themes identified were kept because of their specificity, relevance and independence.

These are the weak themes identified under the Intra-Organizational Governance block (category): (1) Switch Use Capabilities, (2) Knowledge Management, (3) R&D Roles, (4) IS Universities, and (5) PMO-IT. Hence, only 5 themes over 20 (25%) are considered weak in the Intra-Organizational block. The other 75% can be used effectively to compare the cases. Additionally, only 30 references to those 5 themes were created throughout the 3 iterations that represent only 9.3% of all the references to themes in the Intra-Organizational block.

In the Inter-Organizational Governance block, 11 secondary themes were identified: (1) Switching Costs, (2) Regulators [role], (3) Professional Associations, (4) External R&D Role, (5) Experts Role, (6) Exchange Groups, (7) Engineering Consultant Role, (8) Consultant Sales Capability, (9) Client's Role, (10) Challenging Consultants, and (11) Applications Knowledge. The percentage of secondary themes is higher in Inter-Organizational Governance with 46%. However, out of the total 444 references created in this block (category), only 43 (9.7%) were references to the 11 secondary themes identified. Thus, 54% of themes in Inter-Organizational Governance account for 90.3% of the references. This table describes the minor adjustments conducted at the end of Iteration 3 (excluding the new themes created in the Iteration):

Iteration 3 Adjustments			
Theme	**Iteration**	**Blocks impacted**	**Adjustments**
1. Governance System	- 2C: ERP-FOOD	- Intra-Org. Governance Project Governance	- Removed - Content coded in Governance Rules and System under Project Governance
2. Project Manager Role	- 2A: MC-OPTIC	- Intra-Org. Governance Project Governance	- Removed - Content coded in PMO Role and Nature under Project Governance
3. PMO-IT	- 1B: BASEL II-BANK	- Intra-Org. Governance Project Governance	- Removed - Content coded in PMO Role and Nature under Project Governance
4. Governance Rules and System	- 3B: CRM-ENERGY	- Project Governance	- Re-used to code previously analyzed content - Content was coded with the new theme in case 1A (2 references), 1C (1 reference) and 2A (8 references)

Iteration 4

The only new theme created during this Iteration is Strategic Front-End Sessions. The content of the theme was hidden in two other themes: (1) Roadmapping and (2) Strategy Workshops. The front-end strategic episode is part of the roadmap but because of its conceptual importance and its recurrence over the case studies it should be isolated. On the other hand, Strategy Workshops

was too specific and had to be merged with a broader theme. The only time the front-end problem definition Iteration was done in the form of a workshop or at least described as a workshop is in the PLM-AEROSPACE1 case.

This table shows the adjustments to the themes structure in Iteration 4 (excluding the creation of new themes):

Iteration 4 Adjustments			
Theme	**Iteration**	**Blocks impacted**	**Adjustments**
1. Portfolio Effects	- 1A: DDS-THEME PARK	- Project Governance	- Renamed to Portfolio Management
2. Strategic Workshops	- 1C: PLM-AEROSPACE1	- Project Governance	- Removed - Content coded in Strategic Front-End Sessions
3. Roadmapping	- 1A: DDS-THEME PARK	- Project Governance	- Some content moved to Strategic Front-End Sessions (the content describing front-end strategic activities with or without consultants)

At the end of the Iterations 4 adjustments, the model (classification structure) contained 64 themes. The table shows the reference frequency (density) for every block in every interview analyzed in Iteration 4 (after adjustments):

Theme Blocks	A: EHR-HEALTH	B: ECM-DEFENSE	C: CM-INSURANCE	TOTAL
1: Project Governance	59	60	59	178
2: Intra-Organizational Governance	43	43	49	135
3: Inter-Organizational Governance	66	69	55	190
4: Innovation	31	17	23	71
TOTAL REFERENCES	**199**	**189**	**186**	**574**

During the Iteration 4 adjustments, certain weak themes like Challenging Consultants (in External Governance), R&D Role (Internal Governance) were kept for two reasons: (1) either because they were pertinent in their specific case or (2) because they could not be merged with any other theme. For instance, even though R&D Role appeared only once, it has 10 references. The very low frequency of such themes cannot provide statistical significance, yet, qualitatively some of these themes still contain key meanings that could be emphasized in future research.

Iterations 5 and 6

The last six cases were coded in the fifth and sixth iterations. The table below shows the reference frequency (density) for every block in every interview analyzed in iterations 5 and 6:

Theme Blocks	5A: PLM-AEROSPACE2	5B: PLM-ELECTRONICS	5C: ERP-RETAIL	6A: ESE-FINANCE	6B: AD-BANK	6C: PLM-TOYS	**TOTAL**
1: Project Governance	39	34	41	38	31	25	208
2: Intra-Organizational Governance	13	11	27	21	17	27	116
3: Inter-Organizational Governance	57	40	30	22	29	33	211
4: Innovation	16	17	16	5	9	15	78
TOTAL REFERENCES	**125**	**102**	**114**	**86**	**86**	**100**	**613**

Interestingly, the coding of these six last cases led to no adjustments and changes to the themes, categories or classification structure of the research model. This table shows the final reference frequency in all 18 cases for the 4 theme blocks:

Theme Blocks	1A: DDS – THEME PARK	1B: BASEL II - BANK	1C: PLM - AEROSPACE	2A: MC - OPTIC	2B: PLM - ENERGY	2C: ERP - FOOD	3A: CRM - POST	3B: CRM - ENERGY	3C: CRM - RESORTS	4A: EHR - HEALTH	4B: ECM - DEFENSE	4C: CM - INSURANCE	5A: PLM-AEROSPACE2	5B: PLM-ELECTRONICS	5C: ERP-RETAIL	6A: ESE-FINANCE	6B: AD-BANK	6C: PLM-TOYS	**TOTAL**
1: Project Governance	64	69	38	49	52	43	62	52	45	59	60	59	39	34	41	38	31	25	**860**
2: Intra-Org. Governance	31	28	14	58	29	59	18	21	39	43	43	49	13	11	27	21	17	27	**548**
3: Inter-Org. Governance	70	40	73	48	74	24	28	41	46	66	69	55	57	40	30	22	29	33	**845**
4: Innovation	39	13	17	20	28	26	8	16	6	31	17	23	16	17	16	5	9	15	**322**
TOTAL REFERENCES	204	150	142	175	183	152	116	130	136	199	189	186	125	102	114	86	86	100	**2575**

Iteration 7

Once the 6 iterations were completed and the 18 cases analyzed and fully coded, an overall look at the data, themes and research focus triggered a 7th iteration where major structural adjustments and decisions were made. The goal in Iteration 7 was to skim-off the critical themes and to come up with a manageable core model. The model was simplified in the following way: (1) first, the research focus narrowed and a number of themes had to be extracted from the Innovation block, (2) second, secondary themes were taken out of the core model, and (3) third, some themes were merged in larger categories, some split in more precise and comprehensible categories, and finally others recoded to eliminate double references.

Focus on product and market innovation

At this point, the six themes in the Innovation block were brought down to only 2 themes by extracting the following themes: (1) Performance Criteria, (2) Respondent Satisfaction, (3) Organizational Innovations, and (4) Fast Execution. The table below shows the first adjustments conducted in Iteration 7 that affected the Innovation block.

Iteration 7 Adjustments - A	
Themes in Innovation	**Adjustments**
1. Performance Criteria	- Moved from Innovation & Performance to Project Governance. - Performance criteria are now regarded as project-related determinants of innovation and not as indicators of innovation.
2. Respondent Satisfaction	- Moved from Innovation & Performance to Free Nodes. - This theme was too broad to stay and did not only reflect innovation satisfaction. The theme reflected the general satisfaction with regards to all the other aims of the IT project such as cost, delay, client satisfaction, etc.
3. Business Innovations	- Split in two themes: (1) IT-Enabled Product Innovation, and (2) IT-Enabled Process Innovation
4. IT Innovations	- Renamed to IT-Enabled Market Innovations. - The name had to reflect the new IT system developments that are commercialized and in turn improve the offers on the market or create new markets altogether.
5. Organizational Innovations	- Removed and some of the content recoded with governance themes. - The removal solved the problem of double codes.
6. Fast Execution	- Removed completely. - This theme reflected the performance of the project from a project management perspective where cost control and delays are more important than innovation.

Organizational Innovations was completely removed from the model because it was used to code content that was already coded with governance themes. Business Innovations was split in two categories to distinguish between process and product innovations, and IT Innovations was renamed and refined.

Extraction of the secondary themes from the core model

Secondary themes are weaker and case-specific themes that usually occurred less than 20 times (References) in less than 1/3 of the cases (Sources). This table shows the coding results of Block 3 (Intra-Organizational Governance) before Iteration 7 adjustments:

Themes in Intra-Organizational Governance	1A: DDS – THEME PARK	1B: BASEL II - BANK	1C: PLM - AEROSPACE	2A: MC - OPTIC	2B: PLM - ENERGY	2C: ERP - FOOD	3A: CRM - POST	3B: CRM - ENERGY	3C: CRM - RESORTS	4A: EHR - HEALTH	4B: ECM - DEFENSE	4C: CM - INSURANCE	5A: PLM-AEROSPACE2	5B: PLM-ELECTRONICS	5C: ERP-RETAIL	6A: ESE-FINANCE	6B: AD-BANK	6C: PLM-TOYS	**TOTAL**	**AVERAGE**
IT Roles and Competences	4	3	0	10	5	16	2	5	14	4	12	27	3	0	13	9	7	5	**139**	7.72
Change Management	5	6	2	8	16	9	2	5	2	12	3	2	3	2	2	4	2	14	**99**	5.50
Internal Demand & Vision	1	9	6	1	3	3	3	3	3	12	8	3	2	3	5	2	1	3	**71**	3.94
Business Manager's Role	2	2	5	5	5	1	4	1	4	0	6	5	1	3	1	1	1	2	**49**	2.72
New IT Capabilities	1	0	0	0	0	4	0	0	5	11	3	5	2	0	0	2	2	1	**36**	2.00
Corporate Strategy Role	0	0	0	9	0	3	5	3	0	2	2	0	2	0	1	1	0	0	**28**	1.56
Competency Center	2	0	0	0	0	15	0	2	0	0	0	0	0	0	0	0	0	0	**19**	1.06
Business-Technology Partnership	3	0	1	5	0	1	0	0	2	0	3	1	0	3	0	0	3	2	**24**	1.33
IT Strategy & Organization	0	0	0	3	0	0	1	0	5	0	3	3	0	0	2	0	1	0	**18**	1.00
Team Selection Process	2	4	0	3	0	1	0	1	0	0	1	0	0	0	2	1	0	0	**15**	0.83
Switch Use Capabilities	5	0	0	0	0	2	0	0	0	2	0	1	0	0	0	0	0	0	**10**	0.56
R&D Role	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**10**	0.56
Selecting Business Innovations	3	0	0	1	0	1	1	0	0	0	1	2	0	0	0	0	0	0	**9**	0.50
Decentralization	0	4	0	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	**8**	0.44
Shared Services - Resources	0	0	0	1	0	0	0	1	4	0	0	0	0	0	1	0	0	0	**7**	0.39
Knowledge Management	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	**4**	0.22
IS Universities	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	**2**	0.11
TOTAL	**31**	**28**	**14**	**58**	**29**	**59**	**18**	**21**	**39**	**43**	**43**	**49**	**13**	**11**	**27**	**21**	**17**	**27**	**548**	30.44

In the above example (Intra-Organizational Governance), most themes on the lower half were excluded from the core model because of their low occurrence. However, some of the weak themes like Competence Center and Shared Services were merged into stronger themes and thus

kept in the core model. See below for the Intra-Organizational Governance block after adjustments. The table shows all the secondary themes that were separated from the core model:

Iteration 7 Adjustments - B			
Block	**Theme**	**Cases**	**References**
1: Project Governance	1. Delivery Capability	- 5	- 13
1: Project Governance	2. Function & Best of Breed Approach	- 4	- 14
1: Project Governance	3. Joint Activities	- 3	- 8
2: Intra-Organizational Governance	4. IT Strategy & Organization	- 5	- 15
2: Intra-Organizational Governance	5. Decentralization	- 4	- 8
2: Intra-Organizational Governance	6. R&D Role	- 1	- 10
2: Intra-Organizational Governance	7. Knowledge Management	- 1	- 3
2: Intra-Organizational Governance	8. IS University	- 1	- 2
3: Inter-Organizational Governance	9. Professional Associations	- 3	- 4
3: Inter-Organizational Governance	10. Applications Knowledge	- 2	- 4
3: Inter-Organizational Governance	11. Client's Role (End-User)	- 2	- 3
3: Inter-Organizational Governance	12. Consultant's Sales Capabilities	- 1	- 5
3: Inter-Organizational Governance	13. Challenging Consultants	- 1	- 3
3: Inter-Organizational Governance	14. Exchange Groups	- 1	- 3
3: Inter-Organizational Governance	15. Engineering Consultant Role	- 1	- 3
3: Inter-Organizational Governance	16. Switching Costs	- 1	- 1

The above table shows that 16 themes were removed from the core model because of their little significance and comparability across the 18 cases. Some of these factors are possibly important for a specific case but not important for the majority of cases. The number of themes after Iteration 7 adjustments was brought down to 32 from 64.

Merging, splitting and recoding themes to reduce ambiguity

In Iteration 7, several adjustments were brought to the primary themes after the secondary themes were removed from the core model. Some themes like Competence Center and Shared Services (in Intra-Organizational Governance) were merged together, and others that were not completely mutually exclusive like New Capabilities (Strategic Motivations block) and IT-Enabled Exploratory Innovation (Innovation block) were compared and recoded.

The table below shows all the other adjustments that led to the stabilization of the model:

Iteration 7 Adjustments - C		
Themes	**Block**	**Adjustments**
1. Performance Criteria	- Project Governance	- Split into: (1) Business Criteria, and (2) Project Criteria.
2. Mass Customization	- Strategic Motivations	- Merged with New Capabilities - Recoded to eliminate double references found with (shared with themes in the Innovation block)
3. New Capabilities	- Strategic Motivations	- Merged with Mass Customization
4. Modularity 5. Portfolio Management	- Project Governance	- Grouped into Modularity
6. Internal Demand & Vision	- Intra-Org. Governance	- Renamed to Creating Internal Demand & Vision - Merged with Selecting Business Innovations under Internal Demand
7. Selecting Business Innovations	- Intra-Org. Governance	- Merged with Creating Internal Demand & Vision under Internal Demand
8. Business Manager's Role 9. Corporate Strategy Role	- Intra-Org. Governance	- Merged under Internal Roles
10. New IT Capabilities 11. Switch Use Capabilities	- Intra-Org. Governance	- Merged under New Capabilities
12. Competency Center 13. Shared Services / Resources	- Intra-Org. Governance	- Merged under Shared IT Support (Competences and Services)
14. Consultant Selection Process 15. Vendor Selection Process	- Inter-Org. Governance	- Merged under Partner Selection Processes
16. Consultant's Role - IT 17. Consultant's Role -Strategy 18. Vendor's Role 19. Expert's Role	- Inter-Org. Governance	- Merged under Partner Role
20. Buyer-Vendor Partnerships 21. Joint Ventures	- Inter-Org. Governance	- Merged under Partnerships
22. Strategic Importance	- Strategic Motivations - Free Nodes	- Moved from Strategic Motivations to Free Nodes
23. Size	- Project Governance - Free Nodes	- Moved from Project Governance to Free Nodes
24. Project Team	- Project Governance - Free Nodes	- Moved from Project Governance to Free Nodes
25. Changes & Complexity	- Project Governance - Free Nodes	- Moved from Project Governance to Free Nodes
26. Network	- Inter-Org. Governance Free Nodes	- Moved from Inter-Org. Governance to Free Nodes

After the restructuring of the Innovation block, the removal of the 16 secondary themes from the core model, the grouping of the narrow themes, and the division of the broad themes, the model was finally stabilized.

Some themes that were removed from the research model like Respondent Satisfaction, Size and Network and all the themes related to strategic motivations were kept in the Free Nodes and Strategic Motivations blocks along with other free themes such as Respondent Profile, Project Team and Metaphors because they provide additional information that explain the context of the initiatives, their strategic triggers, the background of the respondents and the profile of their companies. The results obtained after Iteration 7 adjustments (at the end of the conceptual stabilization process) are presented in Appendix 8. For instance, by comparing the structure and

content of Block 3 (Intra-Organizational Governance) before and after the Iteration 7 adjustments, we notice the following:

- 5 themes were extracted from the core model in the Secondary Themes category
- The other 12 remaining themes were reduced to 8 themes through a grouping (axial coding) process (8 themes in the set were combined into 4 themes)

Some of the weak themes were kept in the model because they were grouped with other themes to form stronger categories. For example, Selecting Business Innovations became a sub-theme in the broader Internal Demand category bringing the total number of references of that theme to 80. Alone the theme did not occur enough times in the data to remain in the core model.

Rarely was the content of interviews not coded with or referred to a theme or category in Nvivo. Only completely irrelevant and out of context content was skipped but this happened very rarely. When interesting content did not fit in any pertinent theme in the core model, it was still coded with a theme in the Free Nodes block. The themes in the Free Nodes block are attributes that describe the projects, the businesses and the respondents but are not core themes in the model. The Free Nodes and the Strategic Motivations blocks of themes (both excluded from the research model) are presented in Appendix 7 (the lexicon of themes) and 8 (Nvivo exports).

APPENDIX I: THE LEXICON OF THEMES

This lexicon was used throughout the qualitative analysis process as a guide for coding interview content with the highest level of consistency. The detailed definitions of the themes used and the nuances between the themes are critical for the accuracy and validity of the qualitative methodology used.

The lexicon structure follows the structure used in the analysis software used (Nvivo) for organizing the themes: (1) Free Nodes (themes not in the core model), (2) Strategic Motivations (themes not in the core model), (3) block 1 (Project Governance), (4) block 2 (Intra-Organizational Governance), (5) block 3 (Inter-Organizational Governance), and block 4 (Innovation).

In the Theme columns, the theme name is followed by the case in which the theme was created. Notice that most of the themes were created in Iteration 1 (Cases 1A, 1B and 1C).

Free Nodes (themes not in the research model)

Theme	Definition	Examples
1. Strategic Importance – CASE 1A	- Describes how the project is major, transformational, a priority for corporate strategy. - The importance of new projects for the IT division and the level of dynamism. - Includes the extent to which technical issues are NOT important. - Excludes specific attributes to precise strategic goals such as growth, innovation or profitability.	- CASE 1C: This project is on the agenda of our executive team… - CASE 1A: 60% of the company's IT investments go to new projects.
2. Project Team – CASE 1A	- General text on the overall project team. - Describes relationships between different teams and committees. - Includes evolution of team size in the different phases. - Texts on specific structures like specific committees are not coded here.	- The core project team in CASE 1A. - Relationships between lower level committees, higher level committees and project teams.
3. Respondent Satisfaction	- General feelings about project performance, team performance, or the key success factors.	- The ability to accept or refuse business innovations at the buyer in CASE 1A
4. Changes and Complexity – CASE 1C	- The extent to which external factors impact the project and increase its complexity. The level of changes, uncertainties, ambiguities, etc. - Technical versus managerial uncertainties and issues.	- The buyer in CASE 1C struggles to synchronize all the aspects of its PLM project: (1) funding, (2) the buying from internal executives, etc.

5. Network – CASE 1A	- Describes the external innovation network in IT with its members: consultants, vendors, major clients, distributors, etc. - Includes factors such as: (1) knowledge about the evolution of clients' IT systems (BtoB), (2) connectivity technologies (XML), etc.	- The suppliers of GDS systems in CASE 1A.
6. Business Info – CASE 1A	- Information on the business operations, general performance, clients, market, sales, profits, general performance	- CASE 1B : *'Mais on a de plus en plus des risques de marché et [notre banque] avec la banque Royale est la seule banque qui a la meilleure cote sur le double AA sur le marché.'*
7. Respondent Profile – CASE 1A	- The respondent's position, experience, educational background, past jobs, etc.	- CASE 3A: 'I was part of the original initiative…'
8. Size – CASE 1A	- Overall project size and the criteria used to determine the size. - Includes methods used to determine the size of the project.	- The Pain-Gain matrix used in CASE 1A to determine the size of the project. - The size is often a function of strategic motivations and innovation targets.
9. Research Description – CASE 1A	- When the research team members describe the research project, its objectives, expectations, etc.	- CASE 2A : *'Vous voyez qu'il y a un mode d'innovation qu'on trouve dans la collaboration du maître d'ouvrage dans la définition des projets, interaction avec les consultants, ou clients internes, et c'est un peu ça qu'on veut explorer donc …'*
10. Metaphors – CASE 1B	- Metaphors used by respondents to describe an issue or important concept in their project.	- CASE 4C: 'For instance […] if all of a sudden [the company] financially got into trouble, […] we can stop like this and […] have the user happier than a pig in the mud…'
11. Fast Execution – CASE 1B	- The way execution or delivery was fast and effective throughout the project. Fast execution also has a positive effect on trust and general relationships in the project.	- CASE 2C: '*Une petite filiale on la fait en trois mois, une filiale moyenne en 6-7 mois et une grosse filiale en 9 mois.'*
12. Respondent Feedback – CASE 1A	- The Respondent's appreciation of the research questions and objectives.	- CASE 1A: 'c'est une bonne question…'
13. Speech Act - CASE 1A	- When the respondent makes a clear statement about how he describes reality and real business activities.	- CASE 1A: '*Donc vous m'encadrez par rapport aux attentes par-ce que moi je vous raconte ma vie.'*

Strategic Motivations (themes not in the research model)

Theme	Definition	Includes - Excludes	Examples
Strategic Motivations	**Includes all content describing the project triggers, objectives and the importance of the project for business strategy.**		
1. Business Transformation & Integration	- Describes the transformation of major inefficient or ineffective processes at the core of the project.	- Includes content on business integration and centralization. - Includes business process reengineering (BPR) motivations such as those that directly enhance sales and marketing processes.	- In CASE 1A, the Recommender is integrated in the Call Center. - The motivation to centralize and control in CASE 2C.
2. New Capabilities & Mass Customization - CASE 1A	- Describes the new capabilities brought inside the firm through the project. - Describes the specific Mass Customization capability; a specific rule changing capability enabled by the new project.	- Excludes texts that describe how external advancements in IT triggered the project. - Specific Mass Custom capabilities indicate strategic renewal and the penetration of a new innovation game.	- Buyers in cases 1A, 2A and 3C are motivated to deliver new capabilities for long-term mass customization objectives.
3. Efficiency & Cost Reduction	- The project's specific efficiency and cost reduction motivations.	- Excludes all other strategic motivations.	- The primary goal of the CRM project in CASE 3C is efficiency.
4. Innovation & Growth	- The project's specific innovation and growth motivations (as opposed to efficiency and cost reduction)	- Excludes all other strategic motivations. - Includes buyers' ambitions of creating new IT markets with innovative products by becoming a reference.	- In CASE 1C the players aimed at becoming the undisputed reference in the new PLM products.
5. Replacing Legacy Systems: CASE 1C	- The importance of replacing legacy systems for the project, the number of systems replaced with the projects, etc.	- Excludes the positive use of Legacy Systems in the integration or development process. - Includes factors and front-end activities that help determine what commercial tool to integrate, to what extent, and what legacy systems to replace.	- One of the goals in CASE 1C was to replace as many non-strategic legacy systems as possible; the company evaluates what portions of the current processes and legacy systems are strategic before integrating new solutions.
6. Client Satisfaction	- The importance of end-user (or client) satisfaction for the project as a strategic motivation.	- Excludes all other strategic motivations - Includes end-user new needs that trigger the project.	- In CASE 3B, the client satisfaction is the major trigger of the ambitious CRM project.
7. Response to Competition	- When the company uses the project to respond to competitive moves and to remain ahead of competition.	- Includes specific competitive objectives.	- In CASE 2A, the project aimed at blocking the competition from stealing market shares.

Strategic Motivations: Secondary Themes (themes not in the research model)

Theme	Definition	Includes - Excludes	Examples
1. External Technological Advancements (Disruptive Technologies, IT Advancements)	- The external developments in IT that the CIO sees as business drivers.	- Include the new external IT capabilities that can help drive business innovation.	- In CASE 2A, external advancements in digital surfacing machines affected the project.
2. Regulations	- When regulations are a major trigger for the project.	- Excludes all other strategic motivations.	- Regulations in the banking and insurance cases.
3. User Satisfaction	- The satisfaction of internal users and employees.	- Excludes all other strategic motivations.	- In CASE 4B the new collaboration tools were aimed at satisfying employees.

Block 1: Project Governance

Theme	Definition	Includes - Excludes	Examples
Project Governance	**Includes content describing how the project was structured in modules and phases. It also includes the general approach to strategic IT projects. Includes themes such as (1) roadmapping, (2) modularity, and (3) committees.**		
1. Roadmapping – CASE 1A	- The project major phases and the activities in these phases. Also includes start-up dates, delays and the current phase of the project. - The evolution of the scope of the project and the stabilization of the scope for delivery.	- When the description shows transformation of business processes or integration of new capabilities, the text is also coded in Business Transformation. - Includes the evolutionary characteristics. - Excludes very specific content on the strategic front-end episodes.	- When the CIO in CASE 1A describes the phasing of the project and the way it was done in the roadmap in collaboration with internal business managers and external consultants.
2. Modularity – CASE 1A	- Describes in more detail how the single project in the portfolio is modularized and split into smaller chunks for reducing risks and increasing flexibility and innovation. - The portfolio management principles by which all IT projects are managed.	- Includes factors such as the priority of each initiative (or module). - Includes descriptions of reducing the project to smaller manageable modules or chunks.	- In CASE 1B the initiatives were split in four levels of priority instead of using the method prescribed by Basel II. - Both companies in CASE 1A and 1B emphasized this capability.
3. Performance Criteria: (1) Business Criteria, and (2) Project Criteria – CASE 1A	- Business criteria are long-term criteria linked to strategy and business performance. - Project criteria are short term criteria linked to project costs, delays, etc. - Both predetermined and emerging performance criteria are coded here.	- Includes new criteria identified or lessons learned during review processes. - Lessons learned are not predetermined criteria and not foreseen in preliminary checklists. - Includes the identification of weaknesses, strengths, things that work, etc.	- In CASE 1A the simplification of the business rules was used as a performance criterion. - In CASE 1B, one of the performance criterion used was the comparison of the number of projects in a Positioning status versus the number of projects in a Feasibility status.

4. Strategic Front-End Sessions – CASE 4B	- Sessions and mechanisms for opening discussions with both internal and external stakeholders to frame the problem, understand the needs, and come up with a roadmap or project plan.	- Some formal or informal sessions aim at creating the roadmap and sometimes replace committee structures. - The front-end sessions are also used for determining how vendors and consultants will be selected.	- The Visioning and Scoping workshop in CASE 1B at the front-end. The workshop was conducted before selecting the PLM solution.
5. Committees – CASE 1A	- Committees in general including their roles, structures, etc. - Participants of committee only work in their committee issues part-time.	- Includes different levels of committees, executive level and functional or technical level committees. - Also includes important documents used by the committee to structure relationships and coordinate roles and responsibilities.	- Both managerial and technical committees are tagged here. - An example of a document coded here is the Project Charter used in CASE 1A - CASE 1B: making decisions relative to the scope of the project (managing change requests, etc.)
6. Governance Rules and Systems – CASE 3B	- Specific and well-defined governance rules structuring relationships (generally created by the company's executive committee)	- Excludes all descriptions of the specific components of the governance system like committees, internal and external roles, etc.	- In CASE 2C, 150 rules called DOM (D. Operating Models) are used for governing all departments in all branches including IT.
7. Project Reviews – CASE 1A	- Ad hoc moments when the performance of projects is evaluated, modules are dropped and new opportunities captured and integrated. An important learning mechanism.	- Includes the lessons learned during the review process. - The lessons learned can also be considered as new performance criteria.	- The review of the project in CASE 1B when the new PM came in. - In CASE 1A the review unveiled new critical performance determinants like the importance of working on the Master Data Management system very early in the project.
8. Funding Capability – CASE 1C	- The capability to obtain funds for the project and including the source of the funds.	- Includes factors that enable funding.	- In CASE 1B the project manager obtained the needed funds for the upcoming three years period because of her reputation to deliver.
9. PMO Role & Nature – CASE 3B	- The role and nature of the project management office (PMO) and the importance of the PMO for the effective management of the project.	- Includes rules that govern or structure the relationship between the external project managers and the client.	- In CASE 3B, the company hired an external consultant, R3D, to take charge of the CRM project's PMO.
10. Security and IP (decision rules, factors) – CASE 1B	- The way relationships are affected by security and IP sharing issues.	- These issues are generally linked to a certain technical difficulty.	- In CASE 1B these issues are characterized as both 'political' and 'technical'.
11. Trust & Transparency – CASE 1A	- Importance of trust, transparency and social bonds in project synergies.	- Includes factors such as culture and language.	- The fact that Dassault is a French company facilitated the 'sale' of the platform in CASE 2B.

Block 1 (Project Governance): Secondary Themes

Theme	Definition	Includes - Excludes	Examples
1. Delivery Capability – CASE 1B	- The importance of delivery processes and the CIO's delivery capability.	- Includes the way the project is structured and managed by deliverable.	- In CASE 1B, the constant delivery of functionality to the business was a major success factor.
2. Function & BOB Approach - CASE 1B	- An approach that favors function over data and process. The way the project initiatives are organized by function. - The importance of maintaining key BOB legacy systems and connecting them to the new platform.	- This approach can also be seen as part of a portfolio management approach. Includes factors for choosing the approach and impacts on the consultant's selection process. - BOB integration typically happens when consolidation in the industry is weak and fully integrated platforms do not exist.	- In CASE 1B, the function approach was used to organize initiatives; it was also one of the reasons for not hiring IT consulting firms. - The buyer in CASE 1A gradually connects new applications to the key legacy systems it runs.
3. Joint Activities - CASE 1A	- When activities include both internal and external parties. When parties have to collaborate and work in teams to plan, design and solve problems.	- This indicates collaboration work. The mechanisms used to organize collaboration are not clearly identified but the activity is well described.	- The General Design activity in CASE 1A done in collaboration with both business managers and IT consultants.

Block 2: Intra-Organizational Governance

Theme	Definition	Includes - Excludes	Examples
Intra-Org. Governance	**Includes all governance mechanisms, rules, and processes that enable and structure CIO's internal relationships for innovation.**		
1. Change Management – CASE 1A	- Descriptions of important internal change: in perception, in culture, etc., needed for the successful implementation. - The extent of resistance to change.	- Includes change management factors such as the communication of project structure and plans. - Excludes direct CIO or PM effort to create demand. - Content is not coded in Performance and Innovation even if the text describes successful change.	- *Donc ce qu'on a fait, c'est de faire accepter à l'organisation qu'il y avait différentes phases, de les découper, et de les vulgariser pour qu'ils comprennent qu'est ce qui est quoi.*
2. Internal Demand (Creating Demand & Vision, Selecting Business Innovations) – CASE 1A	- The efforts, approaches and factors that led to convincing internal managers and employees to engage in the transformation process. - How internal demand for new IT capabilities was created. - The process or the capability that enables the selection of business ideas to incorporate in the new IT system.	- Include acceptance factors controlled and planned by the CIO or PM. - Includes the level of demand and buy-in. - Very good indicator of the level of leadership and decision-making capability of the CIO. - Includes the creation of an internal vision for the project. The vision is a strong account of the CIO or PM leadership capabilities.	- The buyer's strong capabilities for creating internal demand in CASE 1A. - The business managers' buy-in in CASE 1C weakened by increased distraction cause by increase in sales.
3. IT Roles & Competences – CASE 1A	- Specific roles and competences of internal IT team members.	- Includes the hybrid nature of team members. Certain competences are strongly and positively linked to change management and indicate the strategic importance of IT activities. - Includes the IT role in steering the outsourced activities.	- In CASE 1A, the capability to challenge consultants is highlighted. - The strategic role of the CIO is also an important example for new IT roles and competences.
4. Internal Roles (Business Managers' Roles, Corporate Strategy Roles) – CASE 1A	- Roles and participation of internal business and corporate stakeholders.	- Includes the role of the headquarters of an agency or government institution with a network of units. - This theme is a really good indicator for a project's strategic importance.	- In the EHR case (CASE 4A) the agency (CSSS) had a major role in the strategic front-end and governance of the project.

5. New Capabilities (New IT Capabilities, Switch Use Capabilities) – CASE 1A	- New organizational and managerial capabilities related to IT are coded here. - Capabilities developed during the project and then kept for subsequent phases, other projects or other business units. - The way a new IT capability is used for a function or process it was not intended to support when developed.	- These new organizational capabilities can also be seen as organizational innovations (in Performance & Innovation). - Excludes the capability to challenge consultants. - Only includes descriptions of reused capabilities showing a certain level of diffusion, and business and organizational innovations. When text is coded here it is not coded in Business Innovation or Organizational Innovation.	- At the buyer in CASE 1A, the new IT capabilities built with the DDS system were copied in Florida and California from both technical and organizational point of views.
6. Business-Technology Partnerships – CASE 1A	- The principle where both technology and business are on the same decision level. - The capability to communicate effectively with business managers and to have strong credibility.	- In contrast with the IT Delivery mode, this mode enables the effective and efficient delivery of new functions and modules since IT has the power to postpone, refuse, or modify demands from all business functions. - Mechanisms such as competency centers enable business-technology partnerships and the recycling of business and IT knowledge in both directions.	- The relationship the CIO has in CASE 1A with internal business managers; the CIO has the power to refuse, propose, etc.
7. Internal Team Selection Process – CASE 1B	- Process for selecting internal team members from the business units: who makes the decisions, who influences, etc. - The selection factors.	- Includes key factors for selecting team members such as having 'hybrid characteristics': polyvalence and experience in multiple domains such as IT, business and consulting.	- The respondent at the buyer in CASE 1B had no decision power in selecting the business people on the team. - The buyer's CIO in CASE 1A worked for several years in consulting at Accenture and in IT at Reebok.
8. Shared IT Support (Competence Center & Shared Services) – CASE 1A	- Mechanisms for business integration and for managing enterprise wide processes that require key coordination between different functions. -	- Including the recycling of teams and the creation of hybrid individuals in the competency centers for diffusing IT knowledge throughout the organization and business knowledge inside the IT function. - The extent to which general IT resources were used by the project and the business functions involved.	- ERP firms such as SAP pushed the Competency Center concept. Buyers in CASE 2C, CASE 1A and CASE 3A mention them. - The CIO in CASE 2A mentioned the role of shared resources like IT Architecture and Networks in the project.

Block 2 (Intra-Organizational Governance): Secondary Themes

Theme	Definition	Includes - Excludes	Examples
1. IT Strategy and Organization – CASE 2A	- General IT strategy and the way the strategic IT activities are organized. - Combines the general IT principles guiding the strategies and decision-making of IT managers.	- Excludes strategic motivations directly related to the studied project and those that are not clearly defined by respondents such as the mass customization capability. - Excludes specific outsourcing strategies, coded in Outsourcing.	- In CASE 2A the IT function is organized in 4 major activities that guide the CIO's decision-making process: (1) infrastructure, (1) ERP, (2) collaboration, and (4) core applications.
2. Decentralization – CASE 1B	- Describes both centralization and decentralization approaches. - In decentralization, more business units will sponsor projects and assume responsibility for delivery.	- When decentralization is indirectly described as the process of creating an internal demand, the text is coded under Creating Internal Demand.	- About 50% of the initiatives in CASE 1B were decentralized; accountability given to internal business managers.
3. R&D Role – CASE 2A	- The importance of R&D for the project and the important of the project in helping R&D create value with its output.	- Excludes external R&D (see the secondary themes in block 4)	- In CASE 2A, external R&D labs collaborated and provided scientific knowledge.
4. Knowledge Management – CASE 1A	- The way the CIO and his team manage the knowledge they need to perform effectively: (1) technical knowledge, (2) business process knowledge, (3) managerial knowledge, etc.	- Includes mechanisms such as documents, intranets, procedures, etc.	- In CASE 1A, Knowledge Management and the documentation of IT projects (and the lessons learned) are regarded as important but not priorities.
5. IS Universities – CASE 2C	- Internal educational institutions where employees can get certified for specific programs.	- Excludes informal, indirect or ad hoc learning mechanisms.	- The IS University in CASE 3C is the only example.

Block 3: Inter-Organizational Governance

Theme	Definition	Includes - Excludes	Examples
Inter-Org. Governance	**Includes all governance mechanisms, rules, and processes that structure the CIO's external relationships for innovation and enable the CIO to make better decisions with regards to external IT networks and their role in the IT project.**		
1. Partner Selection Processes: (1) Vendors Selection and (2) Consultant Selection – CASE 1A	- How the company selects its vendor partners or its commercial tools. - Includes the decision criteria such as the stability of vendors and the high levels of acquisitions in the industry that could lead to inefficiencies and large losses. - The general process of selecting consultants (firms, individuals, external project managers, etc.).	- Some selection criteria exist in other themes like the Functional Approach. Other key factors: (1) the client's platform and needs in BtoB settings, (2) the past relationships with vendors, (3) the past experience with products or components, etc. - Includes individual IT consultants and project managers. Includes consultants' sales efforts to convince the client to buy their services. Includes factors such as (1) past relationships, (2) software independent consultants, (3) technical knowledge, and (4) business knowledge.	- In CASE 1B, commercial tools are not selected before the needs and functions are clearly defined. - In CASE 1C, the buyer already had integrated CATIA components in previous projects. - The factors for recruiting temporary individual IT consultants and project managers in CASE 1B. Factors for not hiring consulting firms like IBM in CASE 1B.
2.1 Partner Active Roles: IT Consultants	- The role of IT consultants including new knowledge transfer, the documentations, etc. Also includes the role of individual consultants.	- Includes the general client rules that define the consultant's role and level of implication in specific projects.	- IT consultants have very active and strategic roles in CASE 1A and CASE 2B where they created long-term partnerships with the buyer to build and commercialize the new system.
2.2 Partner Active Roles: Strategy Consultants	- The role of strategy consultants including firms that sell research and frameworks like Gartner, Forester, etc. When it's mainly the consultant's role to build the project Roadmap, the text is also coded in Roadmap.	- When both the role and the project phase are described in the same phrase the code Roadmap is attributed.	- Strategy consultants like BCG, Gartner and Forester are used in most initiatives.
2.3 Partner Active Roles: Vendors – CASE 1C	- The software provider role, responsibility, level of involvement throughout the project phases and value created.	- Including: (1) providing industry best practices and new capabilities (ideas) in new releases, (2) content in regards to markets, (3) integrating requirements in new releases, (4) providing an overall industry roadmap and vision.	- The buyer in CASE 1C values the vision it gets from Dassault for the future of the overall industry. The company also uses Dassault to integrate new specific requirements every time there's a new release planned.
2.4 Partner Active Roles: Experts – CASE 2A	- Role of experts in IT. - Role of external developers of specific applications, etc.	- Excludes all other external roles.	- The role of the research lab in CASE 2A is a good example.

3. Outsourcing / Externalization – CASE 1A	- The approach towards using vendors and consultants of all types. - Approach towards outsourcing and offshore development. - Factors for using commercial applications instead of developing in-house solutions. - Selective outsourcing strategies and principles.	- Includes factors for NOT selecting IT consultants for system integration, etc. - Excludes the selection process and criteria. - Includes factors for using commercial software instead of developing in-house solution: too complex and expensive software, etc.	- The buyer in CASE 1B clearly identified the motivations for not hiring consultants like IBM or Capgemini for their Basel II project. - The buyer in CASE 1C favors outsourcing and replaced its legacy with the Dassault PLM system.
4. Partnerships: (1) Buyer-Vendor, and (2) Joint-ventures with consultants – CASE 1A, 1C	- Characteristics of the strategic relationship between the buyer and vendor. - Characteristics of strategic joint ventures between buyers and consultants.	- Includes factors or mechanisms that enable the co-innovation, exchange and constructive relationship. - Includes benefits like (1) access to information, and (2) higher quality interaction.	- A Dassault employee works full time at the buyer in CASE 1C and meetings in the Dassault labs are organized to test new releases.
5. Contract Management – CASE 1A	- The importance of contracts, the measurement specificity, and the need for formality.	- Includes specific contract types or formal types of relationships in SLAs or ASP (Application Service Provider) contracts.	- The buyer in CASE 2C described the incentive system designed in the contract with Accenture for managing the program.
6. Application Adoption - CASE 1C	- The extent to which the commercial tool is adopted in business processes. The extent to which the tool is adapted and customized to the specific context.	- Includes the extent to which the functionalities in the tool are understood and used. - The capability to quickly adopt new releases and solutions. The capability to adopt new functionalities at the right time (timing).	- In CASE 3C, the CIO highlights the importance of innovating in the way IT systems are used to their full potential.
7. Influencing Vendors' Roadmaps – CASE 1A	- The way the buyer works with software vendors or developers to influence their roadmaps to his own advantage.	- Includes the factors that lead software developers to innovate for the client: (1) complexity, (2) commitment, (3) reselling to others, etc.	- The buyer in CASE 1C influences the roadmap of Dassault Systèmes for their engine design modules.
8. Regulators (rules and influence) – CASE 1B	- Relationship with the regulators (international and national). - The importance of external regulations.	- If the organization influences regulators, the text is coded on Influencing Roadmaps.	- Regulators are only mentioned in the banking and insurance cases where government and industry regulations are critical.
9. External R&D Role – CASE 2A	- Role of researchers in universities, research labs, etc. - Role of external lead users in the development of the preliminary versions of the system.	- Indicates IT's interest in R&D and innovation and understanding of the more critical role played by external R&D and its implications for the IT function.	- In CASE 4A, the hospital had a clear understanding of the value created by the initial investments in R&D and innovation by Purkinje and its first demanding clients or lead users (the private clinics)
10. Social and Personal Contacts – CASE 1A	- Social and trust criteria for selecting specific individuals. Reputation is a key factor.	- Includes descriptions of past relations that lead to more trust.	- The CIO in CASE 1A uses Intuitu Personae contracts with his consulting partner.

Block 3 (Inter-Organizational Governance): Secondary Themes

Theme	Definition	Includes - Excludes	Examples
1. Professional Associations – CASE 1A	- The way IT managers use external professional associations to explore new knowledge and ideas and to exchange with other IT managers in different industries.	- Excludes the other exchange groups.	- The CIO Executive Board and the CIGREF in CASE 1A.
2. Applications Knowledge – CASE 1C	- The importance of knowing what existing commercial solutions offer. - Knowing the context in which the commercial tool was developed.	- This is a factor that leads to more effective decisions in the vendor selection process.	- The buyer's knowledge of commercial PLM solutions in CASE 1C.
3. Clients' Role – CASE 1C	- The role of the buyer's clients in its IT decisions. - The way the company is connected to its clients' IT system.	- Includes the client's influence on the buyer's IT decisions.	- The buyer in CASE 1C had to use the Dassault PLM to connect to the value chain of big clients like Bombardier.
4. Consultant's Sales Capability – CASE 2B	- The capability to persuade and convince the client to buy services, solutions and software tools.	- Includes the capability to understand the client's requirements and motivations. The capability to collect as much information as possible to make better proposals.	- CASE 2B: IBM's capability to convince the buyer to buy the Dassault PLM platform and to hire IBM as the integrator.
5. Challenging Consultants – CASE 1A	- The way IT managers challenge consultants to constantly stimulate creativity, innovation and the control of costs.	- Excludes all other relationships such as formal relationships in contracts, etc.	- This is a key factor for the CIO in CASE 3C.
6. Exchange Groups – CASE 1A	- Groups organized or joined precisely for exchange, learning and exploration of technologies, trends, ideas, etc.	- Excludes professional associations.	- The exchange groups including leading industry players (clients, distributors, vendors, etc.) created by the CIO in CASE 1A.
7. Engineering Consultant Role – CASE 2B	- The role of contracts or suppliers of engineering work.	- These contracts can also be seen as internal departments of large government organizations.	- They had a key role in CASE 2B and even acted on behalf of the buyer in most of the project.
8. Vendor Switching Costs – CASE 1A	- The cost of switching vendors is an important factor in large projects where a large number of vendors are at steak.	- Excludes all other factors that help IT managers make selection decisions in their initiatives.	- In CASE 1A vendors are usually kept for a period of 7 years to maximize the ROI and the investments in the relationship and mutual learning.

Block 4: Innovation

Theme	Definition	Includes - Excludes	Examples
Innovation	**Includes all descriptions and perceptions of the innovation outcome of the IT initiatives: (1) exploitative innovation and efficiency, and (2) exploratory innovation including product innovation and market creation.**		
1. IT-Enabled Exploitative Innovation & Efficiency – CASE 1A	- Business process innovation with a significant impact on efficiency, production, service, and quality. - Business innovation creates value for the end customer.	- Including BPR (Business Process Reengineering) activities that enhance product and service quality. - Excludes changes that only reduce costs and automate existing processes without changing them.	- Most of the cases showed some level of impact on business process innovation.
2. IT-Enabled Exploratory Innovation – CASE 1A	- IT that drives the firm's capability to innovate through systems and tools of measurement, experimentation, collaboration and replication. - The development of new IT systems or modules that are commercialized and that improve the offering on the market. - The process that leads to the commercialization of IT processes and developments with or without external partnerships. - The creation of new markets.	- Including innovations driven by new IT capabilities like Mass Customization. - Excludes innovations that only increase efficiency or reduce costs. - Includes software, solutions or modules developed in partnership and sold to other buyers on a global scale. - Includes positive effects on new software developments that can benefit the external partner from a growth perspective and the buyer	- The new PLM systems in the PLM-AEROSPACE1 and PLM-ENERGY cases drive the product design and innovation process. - In CASE 1A and CASE 2B the new IT solutions are commercialized and sold to third parties and even to competitors. These are co-opetition examples.

APPENDIX J: NVIVO EXPORTS AFTER ITERATION 7

Block 1: Project Governance

Primary Themes	1: DDS - THEME PARK	2: BASEL II - BANK	3: PLM - AEROSPACE1	4: MC - OPTIC	5: PLM - ENERGY	6: ERP - FOOD	7: CRM - POST	8: CRM - ENERGY	9: CRM - RESORTS	10: EHR - HEALTH	11: ECM - DEFENSE	12: CM - INSURANCE	13: PLM-AEROSPACE2	14: PLM-ELECTRONICS	15: ERP-RETAIL	16: ESE-FINANCE	17: AD-BANK	18: PLM-TOYS	**TOTAL**	**AVERAGE FREQUENCY IN ALL CASES**	**% OF CASES COVERED**
1: Roadmapping	12	10	8	15	20	10	20	18	5	19	3	7	12	9	15	14	13	12	**222**	**12.33**	**100%**
2: Modularity	11	18	6	5	3	4	6	6	8	7	1	19	4	6	2	2	3	2	**113**	**6.28**	**100%**
3: Performance Criteria	14	5	3	8	3	9	4	8	3	6	9	5	5	3	7	1	2	4	**99**	**5.50**	**100%**
4: Strategic Planning Sessions	2	1	7	2	5	6	10	8	2	7	12	4	6	4	8	9	1	3	**97**	**5.39**	**100%**
5: Committees	11	3	6	1	3	3	5	1	2	1	3	0	1	3	2	0	4	0	**49**	**2.72**	**83%**
6: Governance Rules & System	2	0	1	8	0	7	1	2	2	0	9	5	1	3	3	2	2	0	**48**	**2.67**	**78%**
7: Project Reviews	9	4	0	2	0	7	0	0	3	6	1	1	5	0	4	3	2	0	**47**	**2.61**	**67%**
8: Funding Process	0	1	4	4	0	0	4	3	0	3	9	4	1	0	1	0	0	0	**34**	**1.89**	**56%**
9: PMO Role & Nature	0	8	0	3	1	0	2	3	2	0	0	3	2	0	0	3	0	0	**27**	**1.50**	**50%**
10: Security and IP	0	2	3	1	4	0	0	0	0	3	3	1	0	1	0	3	2	0	**23**	**1.28**	**56%**
11: Trust & Transparency	2	0	0	0	1	0	0	3	1	0	5	1	1	1	0	0	0	0	**15**	**0.83**	**44%**
TOTAL	**63**	**52**	**38**	**49**	**40**	**46**	**52**	**52**	**28**	**52**	**55**	**50**	**38**	**30**	**42**	**37**	**29**	**21**	**774**	**43.00**	**100%**
Secondary themes																					
1: Delivery Capability	3	3	0	0	0	0	1	0	5	0	0	1	0	2	0	0	0	0	**15**	**1.25**	**33%**
2: Function & BOB Approach	2	8	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	**14**	**1.17**	**33%**
3: Joint Activities	1	0	0	0	6	0	0	0	0	1	0	0	1	0	0	0	0	0	**9**	**0.75**	**25%**
TOTAL	**6**	**11**	**0**	**0**	**6**	**0**	**1**	**0**	**5**	**1**	**1**	**4**	**1**	**2**	**0**	**0**	**0**	**0**	**38**	**3.17**	**67%**

Block 2: Intra-Organizational Governance

Primary Themes	1: DDS - THEME PARK	2: BASEL II - BANK	3: PLM - AEROSPACE1	4: MC - OPTIC	5: PLM - ENERGY	6: ERP - FOOD	7: CRM - POST	8: CRM - ENERGY	9: CRM - RESORTS	10: EHR - HEALTH	11: ECM - DEFENSE	12: CM - INSURANCE	13: PLM-AEROSPACE2	14: PLM-ELECTRONICS	15: ERP-RETAIL	16: ESE-FINANCE	17: AD-BANK	18: PLM-TOYS	**TOTAL**	**AVERAGE FREQUENCY IN ALL CASES**	**% OF CASES COVERED**
1: Change Management	5	6	2	8	16	9	2	5	2	12	3	2	3	2	2	4	2	14	**99**	**5.50**	**100%**
2: Internal Demand	6	7	6	2	4	4	4	3	3	12	7	5	2	3	5	2	1	3	**79**	**4.39**	**100%**
3: Internal Business Support & Roles	2	2	5	14	6	4	9	4	4	2	8	5	3	3	2	2	1	2	**78**	**4.33**	**100%**
4: IT Roles and Competences	4	3	0	10	5	16	2	5	14	4	12	27	3	0	13	9	7	5	**139**	**7.72**	**89%**
5: New Capabilities & Learning	6	0	0	3	0	4	0	0	5	13	3	6	2	0	0	2	2	1	**47**	**2.61**	**56%**
6: Business-Technology Partnership	3	0	1	5	1	0	0	0	2	0	3	1	0	3	0	0	3	2	**24**	**1.33**	**56%**
7: Team Selection Process	2	4	0	3	0	1	0	1	0	0	1	0	1	0	2	0	0	0	**15**	**0.83**	**44%**
8: Shared IT Support	2	0	0	1	0	9	0	3	4	0	0	0	0	0	1	0	0	0	**20**	**1.11**	**33%**
TOTAL	**30**	**22**	**14**	**46**	**32**	**47**	**17**	**21**	**34**	**43**	**37**	**46**	**14**	**11**	**25**	**19**	**16**	**27**	**501**	**27.83**	**100%**
Secondary themes																					
1: IT Strategy & Organization	0	0	0	3	0	0	1	0	5	0	3	3	0	0	2	0	1	0	**18**	**1.00**	**39%**
2: Decentralization	0	4	0	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	**8**	**0.44**	**22%**
3: R&D Role	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**10**	**0.56**	**6%**
4: Knowledge Management	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	**3**	**0.17**	**11%**
5: IS Universities	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	**2**	**0.11**	**6%**
TOTAL	**3**	**4**	**0**	**15**	**0**	**3**	**1**	**0**	**5**	**0**	**4**	**3**	**0**	**0**	**2**	**1**	**1**	**0**	**42**	**2.33**	**61%**

Block 3: Inter-Organizational Governance

Primary Themes	1: DDS - THEME PARK	2: BASEL II - BANK	3: PLM - AEROSPACE1	4: MC - OPTIC	5: PLM - ENERGY	6: ERP - FOOD	7: CRM - POST	8: CRM - ENERGY	9: CRM - RESORTS	10: EHR - HEALTH	11: ECM - DEFENSE	12: CM - INSURANCE	13: PLM-AEROSPACE2	14: PLM-ELECTRONICS	15: ERP-RETAIL	16: ESE-FINANCE	17: AD-BANK	18: PLM-TOYS	**TOTAL**	**AVERAGE FREQUENCY IN ALL CASES**	**% OF CASES COVERED**
1: Partner Selection Processes	10	19	13	2	23	1	7	17	11	22	22	9	21	6	9	1	9	7	**209**	**11.61**	**100%**
2: Partner Active Role	19	2	12	14	22	9	10	7	14	9	10	10	9	7	10	13	7	7	**191**	**10.61**	**100%**
3: Outsourcing / Externalization	7	8	11	14	2	9	5	4	7	3	9	15	3	4	2	2	3	2	**110**	**6.11**	**100%**
4: Partnerships	5	0	9	3	9	1	4	1	0	8	7	6	3	6	2	1	2	2	**69**	**3.83**	**89%**
5: Contract Management	4	0	0	8	5	2	0	0	5	3	8	0	2	8	0	3	5	2	**55**	**3.06**	**67%**
6: Adopting Applications	2	0	9	0	5	2	0	0	4	3	0	4	4	1	3	0	0	7	**44**	**2.44**	**56%**
7: Influencing Vendor Roadmaps	5	2	6	0	3	0	0	0	0	7	0	4	10	0	0	0	1	5	**43**	**2.39**	**44%**
8: Social and Personal Contacts	2	0	0	0	2	0	0	0	1	1	3	0	2	3	2	0	0	0	**16**	**0.89**	**44%**
9: Regulators	0	4	0	0	0	0	0	4	0	3	0	3	1	0	0	0	0	0	**15**	**0.83**	**28%**
10: External R&D Role	0	0	0	6	0	0	0	0	0	1	4	0	0	4	0	0	0	0	**15**	**0.83**	**22%**
TOTAL	**54**	**35**	**60**	**47**	**71**	**24**	**26**	**33**	**42**	**60**	**63**	**51**	**55**	**39**	**28**	**20**	**27**	**32**	**767**	**42.61**	**100%**
Secondary themes																					
1: Professional Associations	2	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	**4**	**0.22**	**25%**
2: Applications Knowledge	0	0	1	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	**4**	**0.22**	**17%**
3: Client's Role	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**3**	**0.17**	**17%**
4: Consultant's Sales Capability	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	**5**	**0.28**	**8%**
5: Challenging Consultants	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**3**	**0.17**	**8%**
6: Exchange Groups	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**3**	**0.17**	**8%**
7: Engineering Consultant Role	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	**3**	**0.17**	**8%**
8: Switching Costs	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	**0.06**	**8%**
TOTAL	**9**	**0**	**2**	**2**	**8**	**0**	**0**	**0**	**1**	**3**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**26**	**1.44**	**58%**

Block 4: Innovation

Primary Themes	1: DDS - THEME PARK	2: BASEL II - BANK	3: PLM - AEROSPACE1	4: MC - OPTIC	5: PLM - ENERGY	6: ERP - FOOD	7: CRM - POST	8: CRM - ENERGY	9: CRM - RESORTS	10: EHR - HEALTH	11: ECM - DEFENSE	12: CM - INSURANCE	13: PLM-AEROSPACE2	14: PLM-ELECTRONICS	15: ERP-RETAIL	16: ESE-FINANCE	17: AD-BANK	18: PLM-TOYS	**TOTAL**	**AVERAGE FREQUENCY IN ALL CASES**	**% OF CASES COVERED**
1: IT-Enabled Exploitative Innovation & Efficiency	3	3	4	2	2	8	8	9	6	2	4	2	3	2	7	7	3	3	**78**	**4.33**	**100%**
2: IT-Enabled Exploratory Innovation	8	2	4	9	12	1	0	0	0	8	3	2	9	7	0	0	2	3	**70**	**3.89**	**72%**
TOTAL	**11**	**5**	**8**	**11**	**14**	**9**	**8**	**9**	**6**	**10**	**7**	**4**	**12**	**9**	**7**	**7**	**5**	**6**	**148**	**8.22**	**100%**

Strategic Motivations (themes removed from the model)

Primary Themes	1: DDS - THEME PARK	2: BASEL II - BANK	3: PLM - AEROSPACE1	4: MC - OPTIC	5: PLM - ENERGY	6: ERP - FOOD	7: CRM - POST	8: CRM - ENERGY	9: CRM - RESORTS	10: EHR - HEALTH	11: ECM - DEFENSE	12: CM - INSURANCE	13: PLM-AEROSPACE2	14: PLM-ELECTRONICS	15: ERP-RETAIL	16: ESE-FINANCE	17: AD-BANK	18: PLM-TOYS	**TOTAL**	**AVERAGE FREQUENCY IN ALL CASES**	**% OF CASES COVERED**
1: Business Trans. & Integration	5	2	11	2	4	8	3	9	1	8	4	10	6	7	3	3	5	2	**93**	**5.17**	**100%**
2: New Capabilities & MC	4	6	7	8	5	3	0	2	6	9	7	1	2	1	0	1	0	3	**65**	**3.61**	**89%**
3: Efficiency & Cost Reduction	4	0	0	0	1	3	2	6	2	8	4	0	1	2	3	1	4	2	**43**	**2.39**	**78%**
4: Innovation & Growth	4	3	0	7	7	0	1	0	1	0	0	1	3	3	0	1	0	1	**32**	**1.78**	**61%**
5: Replacing Legacy Systems	0	0	8	0	0	2	1	8	0	0	1	9	1	0	2	0	0	0	**32**	**1.78**	**50%**
6: Client Satisfaction	4	1	1	0	0	0	0	15	0	0	1	0	0	0	0	0	0	0	**22**	**1.22**	**28%**
7: Response to Competition	0	1	0	11	0	0	0	6	0	0	0	0	2	0	0	0	0	0	**20**	**1.11**	**22%**
TOTAL	**21**	**13**	**27**	**28**	**17**	**16**	**7**	**46**	**10**	**25**	**17**	**21**	**15**	**13**	**8**	**6**	**9**	**8**	**307**	**17.06**	**100%**

Secondary themes																					
1: User Satisfaction	0	0	0	0	0	0	0	0	2	1	5	0	0	0	0	0	0	0	**8**	**0.44**	**17%**
2: Regulation	0	8	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	**10**	**0.56**	**17%**
3: External Tech. Advancem.	1	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**8**	**0.44**	**11%**
TOTAL	**1**	**8**	**0**	**7**	**0**	**1**	**0**	**0**	**2**	**1**	**5**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**26**	**1.44**	**58%**

Free Nodes (themes removed from the model)

Free Nodes	1: DDS - THEME PARK	2: BASEL II - BANK	3: PLM - AEROSPACE1	4: MC - OPTIC	5: PLM - ENERGY	6: ERP - FOOD	7: CRM - POST	8: CRM - ENERGY	9: CRM - RESORTS	10: EHR - HEALTH	11: ECM - DEFENSE	12: CM - INSURANCE	13: PLM-AEROSPACE2	14: PLM-ELECTRONICS	15: ERP-RETAIL	16: ESE-FINANCE	17: AD-BANK	18: PLM-TOYS	**TOTAL**	**AVERAGE**
1: Strategic Importance	2	2	5	19	13	2	3	7	5	5	4	2	2	6	3	2	5	5	**92**	**5.11**
2: Project Team	7	6	0	1	8	4	3	7	5	1	3	5	2	0	2	1	1	3	**59**	**3.28**
3: Respondent Satisfaction	4	4	3	1	8	4	4	2	1	2	3	10	2	3	5	1	4	3	**64**	**3.56**
4: Changes and Complexity	0	4	3	9	1	0	3	2	6	8	2	0	3	4	2	3	2	3	**55**	**3.06**
5: Network	15	5	2	0	0	0	2	1	2	3	3	3	2	1	2	2	2	1	**46**	**2.56**
6: Business Info	3	1	0	16	2	1	0	5	0	2	0	2	1	0	3	1	1	2	**40**	**2.22**
7: Respondent Profile	3	0	0	0	4	0	1	0	8	5	0	6	1	0	2	1	1	2	**34**	**1.89**
8: Size	2	1	0	1	2	0	5	0	2	3	1	5	2	1	2	0	1	1	**29**	**1.61**
9: Research Description	2	5	0	2	5	2	0	1	4	0	1	0	1	0	1	2	0	1	**27**	**1.50**
10: Metaphors	0	4	0	0	0	0	0	0	4	2	0	4	1	0	2	0	0	1	**18**	**1.00**
11: Fast Execution	0	4	0	0	2	2	0	0	0	0	0	5	0	2	1	1	0	0	**17**	**0.94**
12: Respondent Feedback	1	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	**4**	**0.22**
13: Speech Act	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	**3**	**0.17**
TOTAL	**40**	**36**	**13**	**49**	**45**	**15**	**21**	**26**	**38**	**31**	**18**	**42**	**18**	**17**	**26**	**14**	**17**	**22**	**488**	**27.11**